UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

NMFS Tracking No.:
2003/00734

October 17, 2003

Peter F. Poolman, Chief, Environmental Compliance Branch
U.S. Army Corps of Engineers
Walla Walla District
201 North Third Avenue
Walla Walla, Washington 99362-1876

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Upper Salmon River at Challis Project, Salmon River, 1706020102, Custer County, Idaho (Five Projects)

Dear Mr. Poolman:

Enclosed is a document containing a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of the proposed Upper Salmon River at Challis Project in Custer County, Idaho. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Snake River Basin steelhead, Snake River spring/summer chinook, Snake River sockeye and designated critical habitat. As required by section 7 of the ESA, NOAA Fisheries includes reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize incidental take associated with this action.

This document contains a consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and its implementing regulations (50 CFR Part 600). NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for chinook salmon. As required by section 305(b)(4)(A) of the MSA, conservation recommendations and provisions are included that NOAA Fisheries believes will avoid, minimize, mitigate, or otherwise offset adverse effects on EFH.

If you have any questions regarding this document, please contact Dan Blake of my staff in the Idaho Habitat Branch, Salmon Field Office at (208) 756-6019.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: F. Higginbotham - COE
D. Mignogno - USFWS
T. Curet - IDFG
N. Murillo - Shoshone-Bannock Tribes
C. Colter - Shoshone-Bannock Tribes
A. Johnson - Nez Perce Tribe
D. Johnson - Nez Perce Tribe
S. Althouse - Nez Perce Tribe

Endangered Species Act Section 7 Consultation Biological Opinion
and
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Upper Salmon River at Challis Project
Snake River Basin Steelhead, Snake River Spring/Summer Chinook Salmon, Snake River Sockeye Salmon
Salmon River
1706020102
Custer County, Idaho

Lead Action Agency: U.S. Army Corps of Engineers

Consultation Conducted By: NOAA's National Marine Fisheries Service,
Northwest Region

Date Issued: October 17, 2003

/s/ Michael R Crouse

Issued by: ________________
D. Robert Lohn
Regional Administrator

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1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with NOAA's National Marine Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (together "Services"), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations 50 CFR 402.

The analysis also fulfills the Essential Fish Habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

The U.S. Army Corps of Engineers (COE) proposes to restore the channel structure, riparian functions, and habitat elements at five sites along a 12 mile long reach of the Upper Salmon River (12 Mile reach), which extends from the Highway 93 bridge south of Challis, Idaho, to Bruno's Bridge north of Challis. The COE would carry out the Upper Salmon River at Challis Project (USRC) using its authority under section 206 of the Water Resources Development Act of 1996. Under this act, the USRC is a cost-shared project between the COE and the Custer Soil and Water Conservation District (CSWCD), which is utilizing funding from the Bonneville Power Administration (BPA). The administrative record for this consultation is on file at the Idaho Habitat Branch office in Boise.

1.1 Background and Consultation History

The Walla Walla District of the COE has been working since 1999 with a variety of agencies, organizations and landowners in the Challis area to find ways to improve habitat for fish and return the Salmon River and its floodplain to the most healthy, naturally-functioning system possible. In partnership with the CSWCD, BPA, the University of Idaho, the Idaho Department of Fish and Game (IDFG), the Upper Salmon Basin Watershed Project and others, the COE has developed a Feasibility Study that forms the basis for the proposed project.

NOAA Fisheries was contacted in June 2002 to obtain a current list of threatened, endangered, and proposed candidate species that may be present along the Salmon River in the USRC area. The most recent list is dated December 4, 2002, and is available for review at the Walla Walla District office of the COE or from NOAA Fisheries. Laura Hanlon, Fishery Biologist from the NOAA Fisheries office in Salmon, Idaho, attended several technical team field trips and meetings for the USRC beginning in 2001. They provided general guidelines and suggestions on the preparation of the biological assessment (BA), including a copy of the "Determination of Effects Matrix for Naturally Reproducing Snake River Basin Steelhead." The COE also worked with John Johnson, NOAA Fisheries Engineer based in Portland, Oregon, in designing culverts and other structures.

NOAA Fisheries received a complete BA and EFH assessment on the USRC on June 10, 2003, and consultation was initiated at that time. Dan Blake, Fishery Biologist with NOAA Fisheries in Salmon, contacted Fred Higginbotham, Fishery Biologist with the COE in Walla Walla, on July 9, 2003, to see if additional relevant reports, such as the Feasibility Study, were available for review. No other documents for the project had been finalized, and NOAA Fisheries determined that all necessary information for the consultation had been received. Additional contact was made between Dan Blake and Fred Higginbotham as the Opinion was being drafted. A copy of the draft Environmental Assessment for the project was received on August 27, 2003, but it contained no significant additional information needed for the analysis presented in the Opinion.

The USRC would likely affect tribal trust resources. Because the action is likely to affect tribal trust resources, NOAA Fisheries has contacted the Nez Perce Tribe and Shoshone-Bannock Tribes pursuant to the Secretarial Order (June 5, 1997). A copy of the BA on CD-ROM was sent by FedEx to the tribes (including the tribal councils and technical experts) on July 7, 2003, after which the Nez Perce Tribe expressed interest in receiving additional information. A draft copy of this Opinion was sent by email to the tribes on August 6, and they were given two weeks to respond. Scott Althouse, Fishery Biologist for the Nez Perce Tribe, said the tribe generally supports this type of restoration project but would be unable to review the BA or Opinion. The Shoshone-Bannock Tribes were solicited for input, but no response was received.

1.2 Proposed Action

Proposed actions are defined in the Services' consultation regulations (50 CFR 402.02) as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." Additionally, U.S. Code (16 U.S.C. 1855(b)(2)) further defines a Federal action as "any action authorized, funded, or undertaken or proposed to be authorized, funded, or undertaken by a Federal agency." Because the COE proposes to fund the action that may affect listed resources, it must consult under ESA section 7(a)(2) and MSA section 305(b)(2).

1.2.1 Overview

The purpose of the project is to restore the riparian function of the floodplain, the geomorphic function of the river channel, and the fluvial salmonid habitat. The project would specifically benefit Snake River Basin steelhead, and to a lesser extent, Snake River spring/summer chinook salmon, by improving a variety of vital habitat components necessary for salmonid survival in the 12 Mile reach of the Upper Salmon River drainage. The reconnecting of floodplain sections that have been isolated by human activities would improve ecosystem function and the habitat conditions for a wide variety of species.

Several activities would occur on five project sites based on specific restoration needs. In order from upstream to downstream, the sites are located at the Highway 93 Bridge, Dunfee Slough, One Mile Island, Hot Springs, and Pennal Gulch. The range of project activities includes adding culverts or weirs to create side channel habitat, adding barbs (*i.e.*, rock structures) and willow plantings for bank erosion protection, lowering existing dikes or adding culverts and weirs to increase flood frequency, and installing fences and securing conservation easements for managed grazing to improve riparian habitat quality.

The project consists of three phases at each site: initial construction, follow-up or continuing construction that would occur over two years, and maintenance. The goal is to nearly complete initial construction at an individual site during one construction season, with separate sites being constructed during separate seasons. Initial construction would be phased over several years as real estate agreements are negotiated with private landowners.

Instream construction in side channels and sloughs would last six months of each year, beginning as early as September 1 and finishing by March 1. In the mainstem, instream construction would last four and a half months, beginning on September 1 and finishing by January 15. In locations where a turbidity curtain cannot be used, instream construction in the mainstem would begin on September 1 and cease January 15. In dry channels, work in the channel could proceed at any time of year. Opening the ends of a dry channel to allow river water to flow through it would occur from September 1 through January 15. The COE recommends monitoring the river in January for Snake River Basin steelhead that may arrive before January 15 and conferring with NOAA Fisheries to determine how to proceed if steelhead are found. The COE also recommends surveying for Snake River spring/summer chinook salmon redds in the 12 Mile reach during the spawning season before starting instream work. Chinook spawning occurs mostly in August, but also in September in the 12 Mile reach (Curet *et al.* 2003).

1.2.2 Instream Work

Instream and partially instream activities include installing rock sills (one each at Highway 93 Bridge, Dunfee Slough, and Pennal Gulch, ranging from 50 to 120 feet), installing culverts and pipe arches (one at Dunfee Slough, three at Hot Springs, three at Pennal Gulch), grading the slope of a vertical river bank to a 30% grade for 1,200 to 1,700 feet (One Mile Island), constructing water gaps in fences to reduce sediment from livestock grazing (four at Hot Springs, three at Pennal Gulch), creating five jump pools to facilitate salmonid staging by constructing gravel dams and riffles (Hot Springs), placing six cobble beds (Hot Springs), excavating 300 feet of vertical banks to provide 10-foot wide flood prone benches (Hot Springs), deepening the thalweg (*i.e.*, the lowest part of the river bed) for 200 feet (Hot Springs), building a flume and diversion structure to divert irrigation runoff (Hot Springs), closing and draining a pond so a new channel can be excavated (Hot Springs), breaching a levee (Pennal Gulch), lowering a levee to reconnect a floodplain (Pennal Gulch), and excavating portions of an 800 foot stretch of a side channel to improve its transition to the river (Pennal Gulch). Most of the grading and excavation of a new wetland at the Hot Springs site would occur on land that is currently dry. Side channels at the Highway 93, Dunfee Slough, and Hot Springs sites would be excavated on land that is currently dry, but they would have an instream effect during the reconnection process.

The rock sills would extend from the riverbanks out into the streambed, with the upstream side of the sills approximately 0.3 feet above the streambed elevation, and the downstream side flush with the ground line of the riverbank. Both the upstream and downstream sills would taper up with the bank line until reaching a maximum height of 2 feet above the thalweg. The rock sills would be imbedded a minimum of 4 feet below the streambed to avoid undermining by scour. Streambed armoring disturbed during construction of the sills would be replaced to protect the streambed from scour. The design should not present a migration barrier to adult or juvenile salmonids, and it should reduce sediment deposition to facilitate maintenance.

The Hot Springs flume and diversion structure would divert irrigation water into the new wetland or into Challis Hot Springs Creek, depending on the temperature and sediment in the irrigation water. The structure would be constructed to prevent fish passage into the wetland and up the irrigation ditch inflow. The flume would be supported by fill over a 46-inch by 60-inch pipe arch through which the channel of Challis Hot Springs Creek would flow.

An artificial pond at the Hot Springs site will be drained. The outlet structure of the pond has a 3-foot drop that acts as a passage barrier to juvenile and adult salmonids. After draining the pond, a new 1,500-foot long channel would be constructed and contoured through the present pond site. The outlet structure would be removed and the new channel would connect to Challis Hot Springs Creek.

1.2.3 Dry Land Work

Several construction activities would be done completely on dry land. These include installing a French drain (Highway 93), installing barbs and sills to create scour pools (Highway 93, Pennal Gulch), shaping point bars (Highway 93), constructing a levee to connect the floodplain (Highway 93), installing a pipe-arch (Highway 93), building hardened sections of access roads (Highway 93, Pennal Gulch), constructing high flow channels (Highway 93, Pennal Gulch), installing jack and wire fences (all sites), planting trees and shrubs (Highway 93, Dunfee Slough, One Mile Island, Hot Springs), installing rock barbs for flood protection (Highway 93), deepening ponds and channels for a reconnected channel (Dunfee Slough), installing fish screens (two at Dunfee Slough, seven at Hot Springs), rearranging spillway rock to allow low flow fish passage (Dunfee Slough), planting willows and trees along side channels and protecting the banks with cottonwood logs (Pennal Gulch), constructing a new channel from a breached levee around an existing wetland and connecting it with an existing slough (Pennal Gulch), building a 1.5 foot high levee between a new channel and a wetland (Pennal Gulch), constructing temporary roads between work sites (Pennal Gulch), and cutting trees larger than 2 inches in diameter to provide construction access (all sites, ranging from 2-10 trees). The COE believes the dry land activities would not measurably affect salmonids, except some activities occurring at the Pennal Gulch, where equipment would be near the side channel/slough.

Construction access to the sites would occur by existing roads and trails, where available, and would be minimized in areas without roads. Equipment parking, stockpiles, and other staging would be located about 400 feet to 1,000 feet from the river and side channels, generally within previously disturbed areas. Hauling plants, fencing, rock, and other materials for each site would require between 15 and 200 truck trips during construction. Excess material from excavations would be disposed of onsite and outside of the 100-year floodplain. In many cases the material would be used to fill gravel borrow pits left from previous construction activities.

1.2.4 Follow-up Work

Follow-up work will consist of design modifications to accommodate complex stream and ecosystem responses to the project. These construction activities are expected to be required during the two years following the initial construction season. Examples of the types of continuing construction include, but are not limited to:

- Adjustments to the barb and sill structures to ensure that scour pool habitat develops. This could involve repositioning rock within the structures.

- Adjustments to the elevation of culverts in the side channel to ensure adequate year-round flow while preventing excessive sediment deposition. This could involve excavation and reinstallation of a problem culvert.

- Adjustment to the cross section and alignment of side channels. The response of the Hot Springs channel to the spring flows and potentially large pulses of irrigation water is of particular concern. Possible adjustments include removal of sediment deposits, channel realignment, replanting of vegetation to protect banks from erosion, and changes to levee heights and width.

- Modification of gravel dam and riffle structures at the Hot Springs site to ensure fish passage and pond depth. This potentially involves reshaping the weir crest of the dam, adding or removing dam material, changing the slope, and adding large cobble material.

- Adjustment of high flow channels to avoid fish strandings and prevent damage to adjacent road sections. This could involve excavation and filling to adjust channel sections, planting for erosion protection, and adjustments to the roadway armor.

- Corrections to design and construction deficiencies. This work may include a wide range of activities such as replacing or adding to erosion protection at culvert exits, replacing broken or failed stone structures, replacing trees and plants that die, and modifying weir and diversion structures.

1.2.5 Maintenance

Maintenance activities are performed by the CSWCD and will extend beyond the initial construction and follow-up work. This Opinion covers maintenance only within five years after the date of signature. Covered activities include:

- Repairing fences every year.

- Replacing weir boards (approximately every three years).

Separate consultation is required for maintenance activities beyond five years of the date of signature and the following maintenance activities described in the BA:

- Removing deposition from channels and blockages of channel entrances (approximately every five years, subject to flood event magnitudes).

- Replacing and repositioning stones in the entrance rock sill structures (approximately every 20 years, subject to flood event magnitudes).

- Cleaning cobble beds to remove and/or replace cobbles (approximately every five years).

- Reconstructing fences (beginning in 10 years).

- Removing wetlands vegetative mat to maintain freeboard (approximately every 15 years).

- Removing sediment depositions from wetlands basin (annual removal).

- Replacing weir, diversion, and fish screen structures (major repair or replacement estimated at 30- to 50-year intervals).

1.2.6 Construction Process

The construction process would vary for each site. For side channels with little groundwater inflow (most of the flow is from irrigation inflow or from the new connection to the main channel), irrigation inflow will be routed around the construction area using pumps and hoses so sediment will not move downstream. For side channels with significant groundwater flows, a 100 foot to 400 foot reach will be isolated with coffer dams and water will be pumped around the work area. Pumps will be equipped with screens meeting NOAA Fisheries requirements (NMFS 1995; NMFS 1996a). If cofferdam installation and use is expected to generate more sediment than would be generated by the actual construction activity, a turbidity curtain will be used in place of cofferdams and pumps.

Work would begin upstream and proceed downstream so fine sediment will be less likely to accumulate. Direct work in the main river channel, side channel and installation or removal of cofferdams would be limited to less than four hours per day in order to limit the releases of sediment. Work on the main channel of the Salmon River would consist primarily of excavating entrance connections to a side channel that would be constructed and, where river velocities allow, turbidity curtains will be used to contain sediment that is generated. If the water velocities in the main channel prevent use of a turbidity curtain, the instream work will be limited to four hours each day. In general, if machine work produces unacceptable levels of sediment under the Clean Water Act, instream work would be limited to four hours per day.

When excavation, such as deepening a thalweg, occurs in an area that could have anadromous fish, instream work will proceed slowly to allow fish to escape the work area. In areas where water levels are lowered for construction, fish salvage efforts will follow IDFG procedures.

Irrigation flows entering new side channels would be screened to prevent fish passage using one of two methods the COE refers to as “fish screens.” If the irrigation ditch has a steep gradient, the passage would be blocked using a structure with a drop of at least 3 feet through a comb or grating (called a “drop box”). If the irrigation ditch gradient is shallow, fish screens would be consistent with designs used by the IDFG and meeting NOAA Fisheries standards (Nordlund 1996).

1.3 Description of the Action Area

An action area is defined by the Services’ regulations (50 CFR Part 402) as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” The action area affected by the proposed action starts at the project location on the Salmon River at River Mile (RM) 324.9 and extends downstream through the five project sites, including side channels and Challis Hot Springs Creek, to RM 318.8. The fifth field hydrologic unit code encompassing the action area is 1706020102. This area provides habitat as a migratory corridor for juveniles and adults, spawning, rearing, and growth for the salmonid Evolutionarily Significant Units (ESUs) listed in Table 1.

2. ENDANGERED SPECIES ACT - BIOLOGICAL OPINION

The objective of this Opinion is to determine whether the USRC is likely to jeopardize the continued existence of Snake River Basin steelhead, Snake River spring/summer chinook salmon and Snake River sockeye salmon or destroy or adversely modify the designated critical habitat of the salmon species.

2.1 Evaluating the Effects of the Proposed Action

The standards for determining jeopardy and destruction or adverse modification of critical habitat are set forth in section 7(a)(2) of the ESA. In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps of the consultation regulations and when appropriate combines them with the Habitat Approach (NMFS 1999): (1) consider the biological requirements and status of the listed species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species, and whether the action is consistent with any available recovery strategy; and (4) determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages.[1] In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species or result in the destruction or adverse modification of critical habitat. If jeopardy or adverse modification is found, NOAA Fisheries may identify reasonable and prudent alternatives for the action that avoid jeopardy and/or destruction or adverse modification of critical habitat.

The fourth step above (jeopardy/adverse modification analysis) requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (*i.e.*, effects on essential features). The second part focuses on the species itself. It describes the action's effects on individual fish, populations, or both, and places that impact in the context of the ESU as a whole. Ultimately, the analysis seeks to determine whether the proposed action is likely to jeopardize a listed species' continued existence or destroy or adversely modify its critical habitat.

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[1] The Habitat Approach is intended to provide guidance to NOAA Fisheries staff for conducting analyses, and to explain the analytical process to interested readers.

2.1.1 Biological Requirements

The first step NOAA Fisheries uses when applying ESA section 7(a)(2) to the listed ESUs considered in this Opinion includes defining the species' biological requirements within the action area. Biological requirements are population characteristics necessary for the listed ESUs to survive and recover to naturally reproducing population sizes at which protection under the ESA would become unnecessary. The listed species' biological requirements may be described as characteristics of the habitat, population or both (McElhany *et al*. 2000). NOAA Fisheries has developed interim recovery targets for population sizes of the listed species. The annual targets are 4,700 adult Snake River Basin steelhead spawners for the Upper Salmon, 5,100 adult Snake River spring/summer chinook salmon spawners in the Upper Salmon River Basin, and 1,500 adult Snake River sockeye salmon spawners in two lakes (Appendix A).

For actions that affect freshwater habitat, NOAA Fisheries may describe the habitat portion of a species' biological requirements in terms of a concept called properly functioning condition (PFC). The PFC is defined as the sustained presence of natural[2] habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation (NMFS 1999). The PFC, then, constitutes the habitat component of a species' biological requirements. Although NOAA Fisheries is not required to use a particular procedure to describe biological requirements, it typically considers the status of habitat variables in a matrix of pathways and indicators (MPI) (NMFS 1996b) that were developed to describe PFC in forested montane watersheds. In the PFC framework, baseline environmental conditions are described as "properly functioning," "at risk," or "not properly functioning."

The USRC would occur within designated critical habitat for the Snake River spring/summer chinook salmon and Snake River sockeye salmon ESUs. Freshwater critical habitat can include all waterways, substrates, and adjacent riparian areas[3] below longstanding, natural impassable barriers (*i.e.*, natural waterfalls in existence for at least several hundred years) and dams that block access to former habitat (see citations in Table 1).

Essential features of critical habitat for the listed species are: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (juvenile only), (8) riparian vegetation, (9) space, and (10) safe passage conditions. For this consultation, the essential features that function to support successful adult and juvenile migration, adult holding, spawning, incubation, rearing, and growth and development to adulthood include

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[2] The word "natural" in this definition is not intended to imply "pristine," nor does the best available science lead us to believe that only pristine wilderness will support salmon.

[3] Riparian areas adjacent to a stream provide the following functions: shade, sediment delivery/filtering, nutrient or chemical regulation, streambank stability, and input of large woody debris and fine organic matter.

substrate, water quality, water quantity, water temperature, riparian vegetation, and safe passage conditions. The majority of these essential features of critical habitat are included in the MPI (NMFS 1996b) (discussed in more detail in Section 2.2.1).

2.1.2 Status and Generalized Life History of Listed Species

In this step, NOAA Fisheries also considers the current status of the listed species within the action area, taking into account population size, trends, distribution, and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species and also considers any new data that is relevant to the species' status. Please refer to this section for a discussion of the general life history of the listed species. Additional information on the species can be found in Appendices B and C.

The COE found that the USRC is likely to adversely affect Snake River Basin steelhead, Snake River spring/summer chinook salmon and designated critical habitat identified in Table 1. Based on the life histories of these ESUs, the action agency determined that it is likely that juvenile life stages of these listed species would be adversely affected by the USRC. Snake River sockeye salmon have a migration corridor and designated critical habitat along the USRC, but the COE found that the project is not likely to adversely affect this species because instream project work is timed to avoid major migration periods.

TABLE 1. References for additional background on listing status, critical habitat designation, protective regulations, and life history for the ESA-listed and candidate species considered in this consultation.

Species ESU	Status	Critical Habitat Designation	Protective Regulations	Life History
Snake River spring/summer chinook salmon (***Oncorhynchus Tshawytscha***)	Threatened; April 22, 1992; 57 FR 14653[4]	October 25, 1999, 64 FR 57399[5]	July 10, 2000; 65 FR 42422	Matthews and Waples 1991; Healey 1991
Snake River sockeye salmon (*O. nerka*)	Endangered; November 20, 1991; 56 FR 58619	December 28, 1993, 58 FR 68543	ESA section 9 applies	Waples *et al.* 1991; Burgner 1991
Snake River Basin steelhead (***O.*** *mykiss*)	Threatened; August 18, 1997; 62 FR 43937	None[6]	July 10, 2000; 65 FR 42422	Busby *et al.* 1996; BRT 1998

2.1.2.1 Snake River Spring/Summer Chinook Salmon

The Snake River spring/summer chinook salmon ESU, listed as threatened on April 22, 1992 (57 FR 14653), includes all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, and Salmon Rivers. Some or all of the fish returning to several of the hatchery programs are also listed including those returning to the Tucannon River, Imnaha, and Grande Ronde hatcheries, and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River. Critical habitat was designated for Snake River spring/summer chinook salmon on December 28, 1993 (58 FR 68543) and was revised on October 25, 1999 (64 FR 57399).

Historically, the Snake River drainage is thought to have produced more than 1.5 million adult spring/summer chinook salmon in some years during the late 1800s (Matthews and Waples 1991). By the 1950s the abundance of spring/summer chinook had declined to an annual average of 125,000 adults and by the mid-1960s, the species had further declined to an average of about 60,000 adults. Adult returns counted at Lower Granite Dam reached all-time lows in the

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4 Also see June 3, 1992, 57 FR 23458, correcting the original listing decision by refining ESU ranges.

5 This corrects the original designation of December 28, 1993 (58 FR 68543) by excluding areas above Napias Creek Falls.

6 Critical habitat for Snake River Basin steelhead was designated on February 16, 2000 (65 FR 7764), but administratively withdrawn on April 30, 2002. Therefore, critical habitat is not designated at this time.

mid-1990s, and numbers have begun to increase since 1997. Over a 10-year period from 1992 to 2001, which includes the year of listing (1992), returns of wild/natural fish ranged from 183 in 1994 to 12,475 in 2001, and averaged 3,314 salmon adults. The estimated smolt production capacity of 10 million smolts for rivers in Idaho, coupled with historic smolt to adult return rates of two percent to six percent, indicate Idaho could produce wild/natural runs of 200,000 to 600,000 adults (Fish Passage Center 2002). The recent low numbers are reflected throughout the entire distribution of chinook salmon subpopulations scattered throughout the Grande Ronde, Imnaha, Tucannon, and Salmon River Basins. Redd counts and estimates of parr and smolt densities generally indicate that fish production is well below the potential, and continuing to decline.

Although there were record returns in 2000 and 2001, numbers in general have been very low for the last several decades in comparison to historic levels (Bevan *et al.* 1994). Average returns of adult Snake River spring/summer chinook salmon are also low in comparison to interim target species recovery levels of 44,766 for the Snake River Basin (Appendix A). The low returns amplify the importance that a high level of protection be afforded to each adult chinook salmon, particularly because spawning adults are ready to reproduce (approximately 2,000 to 4,000 progeny per adult female) and a very small percentage of salmon hatched in a given year survive to this life stage.

Spawning and rearing habitats are commonly impaired in the range of this ESU through activities such as tilling, water withdrawals, timber harvest, grazing, mining, and alteration of floodplains and riparian vegetation. Mainstem Columbia River and Snake River hydroelectric developments have altered flow regimes and estuarine habitat, and disrupted migration corridors. Competition between natural indigenous stocks of spring/summer chinook salmon and spring/summer chinook of hatchery origin has likely increased due to an increasing proportion of naturally-reproducing fish of hatchery origin.

The exceptionally large numbers of adult chinook salmon that returned to the Snake River drainage in 2000 and in 2001 are thought to be a result of favorable ocean conditions, and above average flows in the Columbia River Basin (CRB) when the smolts migrated downstream. However, these large returns are only a small fraction of the estimated returns of the late 1800s. Recent increases in the population are not expected to continue, and the long-term trend for this species indicates a decline. Detailed information on the current range-wide status of Snake River chinook salmon under the environmental baseline, is described in a chinook salmon status review (Myers *et al.* 1998). Habitat improvements would not necessarily correspond to increased salmon productivity because a myriad of other factors can also depress populations, but diminished habitat quality would probably correspond to reduced productivity (Regetz 2003).

2.1.2.2 Snake River Sockeye Salmon

The Snake River sockeye salmon ESU, listed as endangered on November 20, 1991 (56 FR 58619), includes populations of sockeye salmon from the Snake River basin, Idaho (extant populations occur only in the Stanley River subbasin). Under NOAA Fisheries' interim policy on artificial propagation (58 FR 17573), the progeny of fish from a listed population that are propagated artificially are considered part of the listed species and are protected under the ESA. Thus, although not specifically designated in the 1991 listing, Snake River sockeye salmon produced in the captive broodstock program are included in the listed ESU. Given the dire status of the wild population under any criteria (a total of 23 wild fish returned to Redfish Lake during the 10-year period 1990 through 1999), NOAA Fisheries considers the captive broodstock and its progeny essential for recovery. Snake River sockeye salmon enter the Columbia River in late spring and early summer and reach the spawning lakes in late summer and early fall. The entire mainstem Salmon River was designated as critical habitat for sockeye salmon on December 28, 1993 (58 FR 68543); however, spawning and rearing habitat is in the Upper Salmon subbasin in lands managed by the Sawtooth National Recreation Area. The portion of the Salmon River within the action area is primarily used as a migration corridor.

2.1.2.3 Snake River Basin Steelhead

The Snake River Basin steelhead ESU, listed as threatened on August 18, 1997 (62 FR 43937), includes all natural-origin populations of steelhead in the Snake River basin of Southeast Washington, northeast Oregon, and Idaho. None of the hatchery stocks in the Snake River basin are listed, but several are included in the ESU. Critical habitat for Snake River Basin steelhead was designated on February 16, 2000 (65 FR 7764) but administratively withdrawn on April 30, 2002. Therefore, critical habitat is not designated at this time.

Natural runs of Snake River Basin steelhead have been declining in abundance over the past several decades. Some of the significant factors in the declining populations are mortality associated with the many dams along the Columbia and Snake Rivers, losses from harvest, loss of access to more than 50 percent of their historic range, and degradation of habitats used for spawning and rearing. Possible genetic introgression from hatchery stocks is another threat since wild steelhead comprise such a small proportion of the population. Additional information on the biology, status, and habitat elements for Snake River Basin steelhead are described in Busby *et al.* (1996).

The 2000 and 2001 counts at Lower Granite Dam indicate a short-term increase in returning adult spawners. Adult returns (hatchery and wild) in 2001 were the highest in 25 years and 2000 counts were the sixth highest on record (Fish Passage Center 2001a). Increased levels of adult returns are likely a result of favorable ocean and instream flow conditions for these cohorts. Although steelhead numbers have dramatically increased, wild steelhead comprise only 10-20% of the total returns since 1994. Consequently, the large increase in fish numbers does not reflect a true change in steelhead status based on historic levels. Recent increases in the population are not expected to continue, and the long-term trend for this species indicates a decline.

Survival of downstream migrants in 2001 was the lowest level since 1993. Low survival was due to record low run-off volume and elimination of spills from the Snake River dams to meet hydropower demands (Fish Passage Center 2001b). Average downstream travel times for steelhead nearly doubled and were among the highest observed since recording began in 1996. Consequently, wide fluctuations in population numbers are expected over the next few years when adults from recent cohorts return to spawning areas. Detailed information on the current range-wide status of Snake River Basin steelhead, under the environmental baseline, is described in a steelhead status review (Busby *et al.* 1996) and a status review update (BRT 1998).

2.1.3 Environmental Baseline in the Action Area

The environmental baseline is defined as: "The past and present impacts of all Federal, state, or private actions and other human activities in the action area, including the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of state and private actions that are contemporaneous with the consultation in progress" (50 CFR 402.02). In step 2, NOAA Fisheries evaluates the relevance of the environmental baseline in the action area to the species' current status. In describing the environmental baseline, NOAA Fisheries evaluates essential features of designated critical habitat and the listed Pacific salmon ESUs affected by the proposed action. The action area is described in Section 1.3 of this document.

In general, the environment for listed species in the CRB, including those that migrate past or spawn upstream from the action area, has been dramatically affected by the development and operation of the Federal Columbia River Power System (FCRPS). Storage dams have eliminated mainstem spawning and rearing habitat, and have altered the natural flow regime of the Snake and Columbia Rivers, decreasing spring and summer flows, increasing fall and winter flow, and altering natural thermal patterns. Power operations cause fluctuation in flow levels and river elevations, affecting fish movement through reservoirs, disturbing riparian areas and possibly stranding fish in shallow areas as flows recede. The eight dams in the migration corridor of the Snake and Columbia Rivers kill or injure a portion of the smolts passing through the area. The low velocity movement of water through the reservoirs behind the dams slows the smolts' journey to the ocean and enhances the survival of predatory fish (Independent Scientific Group 1996; National Research Council 1996). Formerly complex mainstem habitats in the Columbia, Snake, and Willamette Rivers have been reduced, for the most part, to single channels, with floodplains reduced in size, and off-channel habitats eliminated or disconnected from the main channel (Sedell and Froggatt 1984; Independent Scientific Group 1996; and Coutant 1999). The amount of large woody debris in these rivers has declined, reducing habitat complexity and altering the rivers' food webs (Maser and Sedell 1994).

Other human activities that have degraded aquatic habitats or affected native fish populations in the CRB include stream channelization, elimination of wetlands, construction of flood control dams and levees, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion/suppression, artificial fish propagation, fish harvest, and introduction of non-native species (Henjum *et al.* 1994; Rhodes *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997). In many watersheds, land management and development activities have: (1) reduced connectivity (*i.e.*, the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; (2) elevated fine sediment yields, degrading spawning and rearing habitat; (3) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; (4) reduced vegetative canopy that minimizes solar heating of streams; (5) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations; (6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and (7) altered floodplain function, water tables and base flows (Henjum *et al.* 1994; McIntosh *et al.* 1994; Rhodes *et al.* 1994; Wissmar *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997).

To address problems inhibiting salmonid recovery in CRB tributaries, the Federal resource and land management agencies developed the *All H Strategy* (Federal Caucus 2000). Components of the *All H Strategy* commit these agencies to increased coordination and a fast start on protecting and restoring.

Pacific salmon populations also are substantially affected by variation in the freshwater and marine environments. Ocean conditions are a key factor in the productivity of Pacific salmon populations. Stochastic events in freshwater (flooding, drought, snowpack conditions, volcanic eruptions, *etc.*) can play an important role in a species' survival and recovery, but those effects tend to be localized compared to the effects associated with the ocean. The survival and recovery of these species depends on their ability to persist through periods of low natural survival due to ocean conditions, climatic conditions, and other conditions outside the action area. Freshwater survival is particularly important during these periods because enough smolts must be produced so that a sufficient number of adults can survive to complete their oceanic migration, return to spawn, and perpetuate the species. Therefore, it is important to maintain or restore essential features and PFC in order to sustain the ESU through these periods. Additional details about the importance of freshwater survival to Pacific salmon populations can be found in Federal Caucus (2000), NMFS (2000), and Oregon Progress Board (2000).

The area being evaluated for this project is at the lower end of the Upper Salmon River Basin hydrologic unit. The basin extends from the headwaters to its confluence with the Pahsimeroi River. The 12 Mile reach of the Salmon River that forms the action area, as well as the town of Challis, lie within an area known as Round Valley. Chinook salmon use this reach as a holding area for adults, a rearing area for juveniles, and a limited spawning area. Steelhead use the reach as a holding area for adults and a rearing area for juveniles. Professional judgment and observations by local biologists indicate that some steelhead spawning occurs in the 12 Mile reach, all by hatchery stocks (Higginbotham 2003).

Streamflow regimes are typical of central Idaho mountain streams, with peak flows in late spring to early summer that occur from snowmelt runoff. Low flows occur in late summer through the winter.

Flows vary substantially annually due to fluctuating precipitation and temperatures. The Idaho Department of Environmental Quality (IDEQ) has used several gauging stations located throughout the subbasin to gather flow data. A gage located on the Salmon River near Bayhorse Creek (about 8 miles south of Round Valley) recorded average flows of 1,490 cubic feet per second (cfs), minimum average flows of 855 cfs and maximum average flows of 2,470 cfs. Another gage on the Salmon River above the Pahsimeroi River confluence had average annual flows of 1,595 cfs, minimum average flows of 935 cfs and maximum average flows of 2,600 cfs. The data years for the flows at these two gages are unknown (IDEQ 2003). The peak flows measured at the gage located near the town of Salmon in 1996 and 1997 were 16,000 cfs and 15,900 cfs, respectively. The estimated peak discharge at the town of Challis was 14,700 cfs and 14,350 cfs, for the same years. These 1996 and 1997 flows were estimated to be 20-year events (Higginbotham 2003).

The topography of the Upper Salmon River Basin includes high elevation alpine peaks, steep mountains, rolling foothills, and river valleys and floodplains. Lands in the low elevation non-glaciated foothills have been shaped by faulting and folding and have been further modified by fluvial and colluvial processes. From its confluence with the East Fork Salmon River, the main Salmon River flows north across dissected foothills and terraces until it enters the Round Valley near Challis. Round Valley is a large open valley about 7 miles long and 3-4 miles wide. Numerous wetlands and large expanses of floodplain characterize the valley. The floodplain of the Upper Salmon River is broad compared to the canyon lands in the lower Salmon River further downstream. Pastureland and irrigated agriculture exist on the river's floodplain throughout the lower reaches of the subbasin, including the vicinity of the USRC.

Most of the Upper Salmon River is a transport system. The Stanley Basin and Round Valley are the most important response reaches because of their large floodplains. The Salmon River channel in the 12 Mile reach has a gentle slope, high sinuosity, and a moderate to high width-to-depth ratio. This stretch of the river is slightly to moderately entrenched.

The river has been crowded to one side of Round Valley to add space for ranching and irrigated agriculture, probably in the early 20th century. Residents upstream of and within the project area have constructed numerous flood-prevention structures (*i.e.,* dikes, gravel removal from the channel bed, *etc.*) to protect their property. Based on site observations and air photo interpretation, the COE believes that the alignment of the channel has been grossly altered by these activities (Higginbotham 2003).

The change in alignment, loss of stabilizing riparian vegetation and sediment load from upstream has caused instability in the channel with roughly 70% of the banks showing evidence of active erosion. The channel now lacks the distribution of riffle and pool habitat that is preferred for salmonid rearing (roughly 50% of each). The existing Upper Salmon River is largely run (glide) habitat, with a small amount of riffle habitat. There are only 5-10 square meters of high quality pool habitat in the project area. The geomorphic changes and intensity of irrigation withdrawals has resulted in some river segments having inadequate surface flows during the irrigation season. The channel lacks large woody debris that is correlated with the low level of existing riparian vegetation. Large wood may be removed by landowners to prevent possible flooding of their property or by rafting guides to eliminate safety hazards, and it is moved naturally during high water events. There is little instream diversity and instream cover (less than 5%).

Upper Salmon River water quality is relatively high. Some streams have sediment and high concentrations of nutrients and metals, particularly in watersheds where improper road construction, mining and livestock grazing have occurred (USRITAT 1998). Water quality in the Salmon River corridor was included in the IDEQ 303(d) list in 1998 as containing pollutants of sediment and temperature from Redfish Lake Creek downstream to the East Fork Salmon River. References that included the 12 Mile reach were not found (IDEQ 2003). Major streams that flow into the Salmon River within the USRC area include Morgan Creek, Challis Creek, and Garden Creek from the west and Pennal Gulch from the east.

Tributaries to Challis Creek within the National Forest boundaries were considered good to excellent quality in an aquatic habitat survey completed by the Forest Service in 1993. However, Challis Creek above the National Forest boundary was identified as poor quality, with elevated bed load sediment, poorly defined channels, excessive erosion and sedimentation. Water quality in Challis Creek from the National Forest boundary to the Salmon River was on the 1998 IDEQ 303(d) list as polluted by sediment, nutrients, and flow alteration (IDEQ 2003).

Garden Creek has no perennial tributaries. It flows directly into the city of Challis and is the municipal water supply for the city. On topographic maps, Garden Creek appears to terminate at Hanna Slough and does not directly intercept the Salmon River. Water quality in Garden Creek from the National Forest boundary to the Salmon River was on the 1998 IDEQ 303(d) list as polluted by sediment and nutrients (IDEQ 2003).

Morgan Creek is a typical central Idaho mountain stream dominated by a snowmelt runoff regime. According to the Forest Service and Bureau of Land Management (BLM), every stream in the Morgan Creek subwatershed has some amount of bank erosion. Numerous unscreened diversions have been in place since the late 1800s. During the irrigation season (*i.e.*, March 15 through November 15), Morgan Creek is sometimes dewatered before it reaches the Salmon River (IDEQ 2003).

Excessive grazing and removal of brush and trees (e.g. willows, cottonwood and aspen) from the riparian zone of the project area has reduced native woody species by an estimated 25% of their original coverage and midday shade by an estimated 10% of the wetted channel. Approximately 85% of the main channel is oriented in a north/south direction, which allows only a small portion of the river to be shaded during the hottest part of the day. About 60% of the east and west banks of the river is open, with only grass, shrubs or gravel bars along the water. Approximately 40% of the 12 Mile reach has mature trees along the shoreline.

Historically, shrubs and small trees dominated the USRC area riparian vegetation, in association with a rich assemblage of herbaceous species. Based on observations within an enclosure at the lower end of the project area and at nearby undisturbed riparian areas, the major riparian shrub species were various willows. Some other native shrubs are also present. Many of the grasses and sedges are native, but their original diversity and extent have been altered.

Mature cottonwood, aspen, dogwood, and willow characterize the riparian area along the USRC. In some cases species composition, age class diversity, and plant vigor, have declined due to disturbances in the area (IDEQ 2003). Improved shrub and tree densities along the river could help keep the river cooler in the summer and may reduce icing in the winter. Summer water temperatures and winter ice are both limiting factors to fish rearing in the main river (IDEQ 2003; USRITAT 1998).

Daily average water temperatures in the Salmon River within the USRC area reach seasonal highs around mid to late July. From this time through the first week of September, average daily water temperatures range from 59 degrees Fahrenheit to 74 degrees Fahrenheit (Higginbotham 2003).

2.2 Analysis of Effects

Effects of the action are defined as: "The direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing the value of habitat for meeting the species' biological requirements or impairing the essential features of critical habitat. Indirect effects are defined in 50 CFR 402.02 as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species or critical habitat of future activities that are induced by the proposed action and that occur after the action is completed. "Interrelated actions are those that are part of a larger action and depend on the larger action for their justification" (50 CFR 403.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02).

In step 3 of the jeopardy and adverse modification analysis, NOAA Fisheries evaluates the effects of proposed actions on listed species and seeks to answer the question of whether the species can be expected to survive with an adequate potential for recovery. In watersheds where critical habitat has been designated, NOAA Fisheries must make a separate determination of whether the action will result in the destruction or adverse modification of critical habitat (ESA, section 3(3) and section 3(5A)). This analysis of effects considers only actions performed from the date of signature to five years hence, and not thereafter.

Project work for the USRC will occur while Snake River sockeye salmon are not migrating through the project area. The project will not prevent fish passage or cause adverse habitat modifications. Further, the project will have no direct effect and may have beneficial indirect effects. Therefore, NOAA Fisheries concurs with the analysis and conclusions reached in the BA by the COE that the USRC activities are not likely to adversely effect or will have no effect on Snake River sockeye salmon. The species will not be discussed further in this Opinion.

The September 1 date for beginning instream work would allow chinook redd surveys to occur prior to commencement of project activities. Although chinook spawning in the Upper Salmon River takes place through most of September, the quality of spawning habitat is poor in the 12 Mile reach and project activities are not anticipated to have a significant effect on chinook spawners if redd surveys confirm the absence of chinook redds in the vicinity of project work. The January 15 date for ending main channel instream work would avoid steelhead spawners, which do not typically arrive until the end of January. Monitoring for early steelhead arrivals and discussions with NOAA Fisheries on how to proceed if steelhead spawners arrive provide necessary precautions. The March 1 date for ending side channel instream work should avoid steelhead spawning because steelhead hold in the mainstem until the middle of March.

2.2.1 Habitat Effects (which may also affect listed species)

NOAA Fisheries will consider any scientifically credible analytical framework for determining an activity's effect. In order to streamline the consultation process and to lead to more consistent effects determinations across agencies, NOAA Fisheries, where appropriate, recommends that action agencies use the MPI and procedures in NMFS (1996), particularly when their proposed action would take place in forested montane environments. NOAA Fisheries is working on similar procedures for other environments. Regardless of the analytical method used, if a proposed action is likely to impair properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward PFC, it cannot be found consistent with conserving the species.

For the streams typically considered in salmon habitat-related consultations, a watershed is a logical unit for analysis of potential effects of an action (particularly for actions that are large in scope or scale). Healthy salmonid populations use habitats throughout watersheds (Naiman *et al.* 1992), and riverine conditions reflect biological, geological and hydrological processes operating at the watershed level (Nehlsen 1997; Bisson *et al.* 1997; NMFS 1999).

Although NOAA Fisheries prefers watershed-scale consultations due to greater efficiency in reviewing multiple actions, increased analytic ability, and the potential for more flexibility in management practices, often it must analyze effects at geographic areas smaller than a watershed or basin due to a proposed action's scope or geographic scale. Analyses that are focused at the scale of the site or stream reach may not be able to discern whether the effects of the proposed action will contribute to or be compounded by the aggregate of watershed impacts. This loss of analytic ability typically should be offset by more risk averse proposed actions and ESA analysis in order to achieve parity of risk with the watershed approach (NMFS 1999).

The USRC BA provides an analysis of the effects of the proposed action on Snake River spring/summer chinook salmon, Snake River sockeye salmon and Snake River Basin steelhead and their critical habitat in the action area. The analysis uses the MPI and procedures in NMFS (1996), the information in the BA, and the best scientific and commercial data available to evaluate elements of the proposed action that have the potential to affect the listed fish or essential features of their critical habitat.

Much of the project work would occur on dry land and would not be likely to adversely affect the species; however, some of the dry land activities at the Pennal Gulch site, where equipment would be near the side channel/slough, would be likely to have an adverse effect. Instream work would be likely to have an adverse effect on any of the species that are present. Based on the proposed work periods and the stream surveys that would occur, both chinook and steelhead juveniles are the only life stage likely to be present during project work. Fish passage will not be blocked on the main stem of the Salmon River during construction. The project is building habitat and improving the environmental baseline by restoring the floodplain and natural features of the stretch of river, so there will be long-term benefits for all life stages of the species. Activities on the five proposed project sites would not occur simultaneously, but would occur during separate seasons, which would help minimize any impacts on chinook salmon or steelhead.

Specific effects are discussed below by the essential features of critical habitat most important to supporting the species in this project area: substrate, water quality, water quantity (and safe passage conditions), water temperature, and riparian vegetation.

2.2.1.1 Substrate

The primary concern is potential recruitment of fine sediments into the river during main channel work and when side channels are reconnected. Sediment inputs that exceed the river's transport ability can become embedded in spawning gravels, which reduces salmonid egg and alevin survival. Stream substrates contaminated with fine particles are less suitable as future spawning and redd production areas, and salmonid populations are typically negatively correlated with the amount of fine sediment in stream substrate (Chapman and McLeod 1987). Excess sedimentation and deposition may also destroy overwintering habitat and pools that act as cover for fry and juveniles, alter production of macroinvertebrate prey species, and reduce total pool volume (various studies summarized in Spence *et al.* 1996).

The problem of sediment affecting redds will be avoided through redd surveys and best management practices. Currently, Snake River spring/summer chinook salmon and Snake River Basin steelhead

utilize the USRC area for only a limited amount of spawning because of the large substrate size. Based on the proximity of any redds to a given project site, best scientific judgment can be used to determine whether project work should be delayed for a season or
whether project work can proceed using specific precautions. Some sediment may enter the river from patches of bare soil where vegetation has been planted, but these effects will be reduced through turbidity curtains and protective erosion material.

Turbidity curtains, cofferdams and water pumps will be used to protect juveniles that may be present and substrate that is adequate for spawning. Instream work will be of limited duration and will not occur at all project sites in the same year. Sediment may have some short-term direct effects on juveniles, but it is not expected that the project is of sufficient magnitude that sediment deposition will significantly destroy habitat or food sources. The levels of sediment production should be such that juveniles could escape to clearer water. Instream work will be limited to four hours per day if machine work produces unacceptable levels of sediment, based on the Clean Water Act.

If juveniles were present along the riverbank during machine grading work on the slope of the bank at the One Mile site or during work near the side channel/slough at the Pennal Gulch site, they could be adversely affected if the machine dropped rock, soil or bank logs into the river. There is a low probability that juveniles would be present around these work sites because the riverbanks are steep and the water velocity is probably too swift for juvenile holding. If juveniles are present, the machine would work slowly to allow them to leave the area.

Overall and in the long term, the project will have a beneficial effect on substrate that should allow for improved spawning conditions in the project area. In particular, the placement of new cobble beds will provide additional spawning habitat. Other project activities will reduce sediment from grazing and irrigation and will help improve fish passage. A new wetland at the Hot Springs site will be designed to hold average flows from the irrigation system for at least
five days, which should allow most of the sediment to settle.

2.2.1.2 Water Quality

Heavy equipment would be used for project implementation in and near the USRC. When the machine is working on the rock sill or opening the ends of the side channel, there is a possibility of an oil, antifreeze or other type of fluid spill. All project vehicles and offices will have spill kits to contain and pick up any contaminant that might be spilled in or near the river. Any potential spill should be cleaned up before chinook or steelhead migrate through Round Valley, but it would have an effect on juveniles. The construction offices, the material storage sites and the equipment parking areas would not have any indirect effects on chinook or steelhead because they would be sufficiently far from the river and spill kits should prevent a contaminant from reaching the river. Any potential spill should be relatively small and should be contained before spreading across a large area. A spill could have some long-term effects, depending on the type of substance involved in the spill, but the effects would be expected to decrease over time.

Water quality downstream of the new water gaps may have increased coliform levels because of the livestock fecal material entering the creek. However, the fecal contaminant levels are likely to be lower than the current levels in the creek because overall access of cattle and horses to the river will be reduced through fencing. Fecal contaminants have not been identified as having an adverse effect on water quality or juvenile salmonids in the project area.

2.2.1.3 Water Quantity and Safe Passage Conditions

Draining the existing pond at the Hot Springs site prior to construction of a new channel may have an adverse effect on juvenile fish. The IDFG surveys conducted in July 2002 found several hundred chinook and steelhead juveniles. There is a high probability for take with this part of the project, and salvage efforts will be conducted for any fish stranded in the pond. In the long term, the new channel will improve habitat conditions. The pond will only be drained while the project is underway.

The project design (*i.e.*, the rock sill, new side channels, culverts, *etc*.) should allow for sufficient water quantities in the main stem and side channels for year-round fish passage and should provide better migration conditions (*i.e.*, cool water and cover). The new structures are designed based on the historic low flows of the main Salmon River. In drought years, some possibility exists for fish to be stranded as water levels drop, but water levels should drop slowly enough to allow adult fish to escape these areas. The side channels will provide additional juvenile rearing habitat and should provide sufficient water levels during low flows. Some mortality could occur in drought years, but incidents should not be more likely than those that naturally occur in project area side channels. The addition of new habitat should provide a net beneficial effect for those life stages that can use side channels.

Installation of fish screens would prevent juveniles and adults from being stranded in irrigation ditches. The omission of fish screens at the Pennal Gulch site could allow juvenile chinook and steelhead to move into a side channel and into irrigation ditches and become stranded. This channel segment has perennial flows supported by a combination of spring and/or groundwater and irrigation flows. The IDFG believes that the habitat benefit from the additional unscreened side channel segment outweighs the risk of fish being trapped further upstream where the irrigation system feeds in. Based on aerial photographs provided during the consultation, the existing upstream portion of the side channel does provide a relatively large amount of water area that would add area for rearing. Because this side channel has perennial flows, the probability and frequency for juvenile fish strandings seem to be relatively low.

2.2.1.4 Water Temperature

Diverting the hot spring water directly into the Salmon River would probably not change the river habitat because it would only change the location where the hot water comes into the river, but not the overall temperature of the main stem. Chinook and steelhead migrate past several other hot springs that flow directly into the Salmon River between Challis and Stanley. Therefore, changing the location where Challis Hot Springs flows into the river is not expected to present a migration barrier to chinook or steelhead. Diverting the hot spring water out of the creek may reduce or remove any thermal barrier that might have existed for juveniles that attempted to enter the creek for refuge or rearing.

All the trees planted along the river or side channel may slightly lower summer water temperatures in the main channel, thus improving migration habitat for chinook and steelhead.

2.2.1.5 Riparian Vegetation

Trees and shrubs planted along the side channels will improve the rearing habitat for juveniles by cooling the water and contributing woody cover. The litter from the trees and shrubs would also help increase aquatic insects as a food source for juveniles. The trees should help cool the water for adults and provide woody cover in the future for holding/resting habitat. A minimal amount of vegetation may be disturbed or removed during project activities, but no riparian trees should be removed. Any negative effects should be short-term.

The new fences would help protect the riparian vegetation from livestock and some human activities. Installation of the fences may disturb some vegetation, but the effects should be minor and short-term.

2.2.2 Species Effects

Based on past similar work, the primary mechanism of mortality is anticipated to be the result of salvage efforts during dewatering. The East Birch Creek project in Oregon displayed a total mortality of less than 1.5 juvenile salmonids per 1,000 feet of channel length averaged over the entire channel (NMFS 2001). Based on the East Birch Creek project, the USRC instream work of 2,600 feet of channel length would result in the death of four juvenile fish. However, a larger number of fish may be affected due to differences between the USRC and East Birch Creek project areas. Individuals trained to IDFG specifications would monitor the instream work sites in order to salvage any juvenile fish that were stranded or endangered by the work.

Direct mortality from the instream construction is anticipated to be secondary to the salvage, but could occur for juvenile chinook or steelhead if they are present. Some elements of work that would be most likely to cause adverse impacts include placing cobble, creating pools, installing culverts, constructing water gaps, deepening the thalweg, grading slopes, excavating connections between side channels and the river, and excavating 300 feet of vertical bank. Cobble material, rocks, bank logs or soil could be dropped on juvenile fish if they are present. In some of these cases, the likelihood for salmonid presence is low because the actions are occurring in areas where the riverbank is steep and the water velocity is too swift for juvenile holding. Machines working in or near the channels could injure or kill juvenile salmonids. Machines would work slowly, allowing any juveniles that may be in the area to move away from project activities.

Mortality is not anticipated for adult chinook or steelhead based on the project timing and the proposed monitoring. However, there is a small chance that adults will be harmed or killed because of the project. If adults are present during project work, the elements of work most likely to cause adverse impacts are the same as those described for juveniles.

The effect that a proposed action has on particular essential features or MPI pathways can be translated into a likely effect on population growth rate. In the case of this consultation, it is not possible to quantify an incremental change in survival for Snake River spring/summer chinook salmon and Snake River Basin steelhead.

While population growth rates have been calculated at the large ESU scale, changes to the environmental baseline from the proposed action were described only within the action area (typically a watershed). An action that improves habitat in a watershed, and thus helps meet essential habitat feature requirements, may therefore increase lambda (*i.e.*, the annual rate of population change) for the populations of the ESU in the action area.

Based on the effects described above and project's goals to restore the functions of the river ecosystem and improve fish habitat, the USRC will have a net positive effect on the survival and recovery of Snake River spring/summer chinook and Snake River Basin steelhead. Although quantifying the change in survival resulting from the USRC is not possible due to other activities in the watershed, the project should allow salmonid populations to increase in the long-term, with relatively minimal short-term effects on the species. The combined change in populations from the USRC and other activities will be measurable in increased number of redds and increases in outmigrations for chinook and steelhead.

2.2.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." These activities within the action area also have the potential to adversely affect the listed species and critical habitat. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being reviewed through separate section 7 consultation processes. Federal actions that have already undergone section 7 consultations have been added to the description of the environmental baseline in the action area.

State, tribal, and local government actions will likely be in the form of legislation, administrative rules or policy initiatives. Government and private actions may encompass changes in land and water uses including ownership and intensity any of which could adversely affect listed species or their habitat. Government actions are subject to political, legislative, and fiscal uncertainties.

Changes in the economy have occurred in the last 15 years, and are likely to continue, with less large-scale resource extraction, more targeted extraction, and significant growth in other economic sectors. Growth in new businesses, primarily in the technology sector, is creating urbanization pressures and increased demands for buildable land, electricity, water supplies, waste-disposal sites, and other infrastructure.

Economic diversification has contributed to population growth and movement, and this trend is likely to continue. Such population trends will result in greater overall and localized demands for electricity, water, and buildable land in the action area; will affect water quality directly and indirectly; and will increase the need for transportation, communication, and other infrastructure. The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect will likely be negative, unless carefully planned for and mitigated.

The USRC is not expected to increase recreational use (e.g. rafting, fishing, hunting, *etc.*) of the Salmon River, livestock use, agriculture, or mining. No adverse cumulative effects are expected from these or other consumptive resource uses on the five project sites. The USRC and subsequent COE environmental restoration projects on other private property in the river corridor, should improve the fisheries habitat by establishing more trees for shade and contributing large wood cover to the river.

Home or business construction is not expected to increase in the river corridor because of the proposed project. Building and subdividing will probably continue in the river corridor for a number of years, regardless of the USRC, but these activities would not continue on the private lands where the COE acquires ecosystem restoration easements. Construction and agricultural use are not likely to occur on the parts of the USRC that are on land administered by the BLM.

Potential adverse cumulative effects caused by home construction or other similar development on private property in the river corridor could affect the suitability of the habitat for chinook salmon and steelhead. These effects may include higher sediment loads from private roads that deliver soil into the river, chemicals that leach into the river from yards or livestock pastures, or unmanaged livestock grazing that damages the riverbank or removes riparian vegetation. In a possible worse case scenario, chemicals leaching into the river from private property could create a migration barrier to adult chinook or steelhead, or even kill some juveniles. In a best case scenario, damage would be limited to loss of a few low bushes in the riparian corridor 150 feet from the river, with little or no effect on adult or juvenile chinook or steelhead.

The IDEQ will establish Total Maximum Daily Loads (TMDLs), a program regarded as having positive water quality effects, in the Snake River basin. The TMDLs are required by court order, so it is reasonably certain that they will be set. The State of Idaho has created an Office of Species Conservation to work on subbasin planning and to coordinate the efforts of all state offices addressing natural resource issues. Demands for Idaho's groundwater resources have caused groundwater levels to drop and reduced flow in springs for which there are senior water rights. The Idaho Department of Water Resources has begun studies and promulgated rules that address water right conflicts and demands on a limited resource. The studies have identified aquifer recharge as a mitigation measure with the potential to affect the quantity of water in certain streams, particularly those essential to listed species.

2.2.4 Consistency with Listed Species ESA Recovery Strategies

Recovery is defined by NOAA Fisheries regulations (50 CFR 402) as an "improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4 (a)(1) of the Act." Recovery planning is underway for listed Pacific salmon in the Northwest with technical recovery teams identified for each domain. Recovery planning will help identify measures to conserve listed species and increase the survival of each life stage. NOAA Fisheries also intends that recovery planning identify the areas/stocks most critical to species conservation and recovery and thereby evaluate proposed actions on the basis of their effects on those areas/stocks.

Until the species-specific recovery plans are developed, the FCRPS Opinion and the related December 2000 Memorandum of Understanding Among Federal Agencies Concerning the Conservation of Threatened and Endangered Fish Species in the CRB, together referred to as the Basinwide Salmon Recovery Strategy, provide the best guidance for judging the significance of an individual action relative to the species-level biological requirements. In the absence of completed recovery plans, NOAA Fisheries strives to ascribe the appropriate significance to actions to the extent available information allows. Where information is not available on the recovery needs of the species, either through recovery planning or otherwise, NOAA Fisheries applies a conservative substitute.

The COE has specific commitments to uphold under the Basinwide Salmon Recovery Strategy. For Federal lands, the interim management strategies for anadromous fish-producing watersheds (PACFISH), the Northwest Forest Plan, and land management plans define these commitments. The USRC meets the Basinwide Salmon Recovery Strategy objectives to "maintain and improve upon the current distribution of fish and aquatic species, and halt declining population trends within 5-10 years," to "establish increasing trends in naturally-sustained fish populations in each subregion accessible to the fish and for each ESU within 25 years," and to "restore habitats on a priority basis." A main purpose of the USRC is to improve fish habitat and increase the distribution of chinook and steelhead. The proposed action is consistent with the specific commitments and primary objectives of the Basinwide Salmon Recovery Strategy (Appendix A).

2.3 Conclusions

The fourth step in NOAA Fisheries' approach to determine jeopardy and adverse modification of critical habitat is to determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival and recovery in the wild or adversely modify or destroy critical habitat. For the jeopardy determination, NOAA Fisheries uses the consultation regulations and, where appropriate, the Habitat Approach (NMFS 1999) to determine whether actions would further degrade the environmental baseline or hinder attainment of PFC at a spatial scale relevant to the listed ESU. The analysis must be applied at a spatial resolution wherein the actual effects of the action upon the species can be determined. The first part of the two-part analysis required in the fourth step is represented below in the summary of the effects on critical habitat and the listed species in the action area. The second part of the analysis places critical habitat and the species effects in the context of the ESU as a whole. In reaching the determinations, NOAA Fisheries used the best scientific and commercial data available.

2.3.1 Critical Habitat Conclusion

The essential features of substrate, water quality, water quantity, safe passage conditions, water temperature and riparian vegetation are all likely to be affected by the USRC. However, the negative effects to the essential features, including sediment production, dewatering, channel alterations, potential contaminant spills, and potential damage to vegetation, will be short-term and temporary as part of the process to improve the critical habitat. These negative effects are outweighed by the short- and long-term beneficial effects of the project. The proposed action is not likely to impair properly functioning habitat, not likely to appreciably reduce the functioning of already impaired habitat, and not likely to retard the long-term progress of impaired habitat toward PFC. The USRC does not compound existing habitat problems with the environmental baseline or anticipated problems from cumulative effects occurring in the action area. The proposed action is consistent with the specific habitat-based commitments and primary objectives of the Basinwide Salmon Recovery Strategy.

After reviewing the current condition of the critical habitat, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the USRC is not likely to destroy or adversely modify their critical habitat.

2.3.2 Species Conclusion

Based on the habitat effects described above, the proposed action will not reduce survival of Snake River spring/summer chinook and Snake River Basin steelhead. The USRC is a site that covers a small portion of the watershed and the short-term negative effects on salmonid species survival would be more than compensated for in the long term. Project work is not sufficient to reduce all juvenile chinook and steelhead populations to the point that the species cannot recover. The salvage operation and instream work will likely involve some take of juvenile chinook and steelhead, but based on stream surveys and anticipated take levels, a significant portion of juveniles will survive these adverse effects. In considering the environmental baseline, cumulative effects occurring in the action area, and the effects of the project, the USRC improves the likelihood for long-term species survival.

After reviewing the current status of the Snake River spring/summer chinook salmon and Snake River Basin steelhead, the environmental baseline for the action area, the effects of the proposed actions, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the USRC is not likely to jeopardize the continued existence of Snake River spring/summer chinook and Snake River Basin steelhead.

2.4 Conservation Recommendations

Conservation recommendations are defined as "discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information" (50 CFR 402.02). Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. The conservation recommendations listed below are consistent with these obligations, and therefore should be implemented by the COE.

1. The COE should not conduct construction and other activities on all of the project sites simultaneously and should attempt to reach near completion of a given site during one construction season. Separate sites should be constructed during separate seasons.

2. The COE should conduct all dryland work before reconnecting and filling these areas with water.

3. The COE should attempt to minimize the amount of follow-up work involved with the project.

In order for NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed species or critical habitat, NOAA Fisheries requests notification of the achievement of any conservation recommendations when the COE submits its monitoring report describing action under this Opinion or when the project is completed.

2.5 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required if: (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending conclusion of the reinitiated consultation. Consultation must also be reinitiated for any maintenance necessary five years after the date this Opinion is signed.

2.6 Incidental Take Statement

The ESA at section 9 (16 USC 1538) prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule (50 CFR 223.203). Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1532 (19)). Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering" (50 CFR 222.102). Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering" (50 CFR 17.3).

Incidental take is defined as "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" (50 CFR 17.3). The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

2.6.1 Amount or Extent of Take

The proposed action is reasonably certain to result in incidental take of the listed species. NOAA Fisheries is reasonably certain the incidental take described here will occur because: (1) the listed species are known to occur in the action area; and (2) the proposed action is likely to cause impacts to critical habitat significant enough to impair feeding, breeding, migrating, or sheltering for the listed species. The instream work is of sufficient duration and magnitude that some listed species are likely to be present at least part of the time and will be susceptible to take. In particular, the salvage operations that are likely to occur will place individuals at significant risk; salvage efforts have been the primary mechanism of mortality during past similar work.

Based on the best available scientific and commercial data, the lethal take of 20 juvenile salmonids (chinook salmon and steelhead combined) is anticipated over the life of the project. The installation and modification of a diversion structure in 2002 on the Lemhi River, further down the Salmon River watershed, resulted in the take of 15 salmonids because of salvage operations. A COE project on East Birch Creek in Oregon in 2001-2002 that is similar to the USRC resulted in a total mortality of less than 1.5 salmonids per 1,000 feet of channel length averaged over the entire channel. Based on the East Birch Creek project, the USRC instream work of 2,600 feet of channel length would result in the death of four fish. Although the magnitude of instream work on the USRC more closely matches the East Birch Creek project, the extent of take resulting from a salvage operation would presumably be more similar to a project in the same watershed. The total take of 20 juvenile fish allows for both the salvage operation and other USRC instream activities. Take is not anticipated for adult fish based on the project timing and the proposed monitoring. However, total lethal take of three adult fish (chinook salmon and steelhead combined) is permitted to allow for unexpected circumstances. If the proposed action results in more lethal take than 20 juvenile salmonids and/or three adult salmonids, the COE would need to reinitiate consultation. The authorized take includes only take caused by the proposed action within the action area as defined in this Opinion, and within five years after the date this Opinion is signed.

2.6.2 Reasonable and Prudent Measures

Reasonable and Prudent Measures (RPMs) are non-discretionary measures to minimize take, that may or may not already be part of the description of the proposed action. They must be implemented as binding conditions for the exemption in section 7(o)(2) to apply. The COE has the continuing duty to regulate the activities covered in this incidental take statement. If the COE fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these RPMs, except those otherwise identified, will not necessitate further site-specific consultation. Activities which do not comply with all relevant RPMs will require further consultation.

NOAA Fisheries believes that the following RPMs are necessary and appropriate to minimize take of listed fish resulting from implementation of the action. These RPMs would also minimize adverse effects on designated critical habitat.

The COE shall:

1. Monitor the effects of the proposed action to determine the actual project effects on listed fish (50 CFR 402.14 (I)(3)). Monitoring should detect adverse effects of the proposed action, assess the actual levels of incidental take in comparison with anticipated incidental take documented in the Opinion, and detect circumstances where the level of incidental take is exceeded. Monitoring for chinook salmon redds in the 12 Mile reach must also occur during the spawning season prior to each instream construction season. Monitoring for adult steelhead must occur from January 1 through January 15 if main channel instream work is occurring.

2. Minimize the impact of incidental take by conducting all instream work, or work near a channel that is likely to have adverse effects on salmonids, from September 1 through January 15 for the main stem and September 1 through March 1 for side channels.

3. Minimize the impact of incidental take by operating all machinery slowly when working in the water to allow juvenile salmonids to escape the work area.

4. Minimize the impact of incidental take by reducing sediment through use of turbidity curtains, cofferdams and limits to the amount of daily instream work.

5. Minimize the impact of incidental take by training the crew in proper fish handling techniques in order to salvage juveniles, if necessary, and carrying out construction according to designs that reduce the risk of fish strandings.

6. Minimize the impact of incidental take by preparing for contaminant spills.

7. Minimize the impact of incidental take by making all adjustments to new side channels in the two years following site completion and consulting with NOAA Fisheries prior to major maintenance activities.

2.6.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the action must be implemented in compliance with the following terms and conditions, which implement the RPMs described above for each category of activity. These terms and conditions are non-discretionary.

1. To implement RPMs 1, above, the COE shall:

   a. Follow these instructions: If a sick, injured, or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at (360) 418-4246. The finder must take care in handling sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

   b. Confer with NOAA Fisheries and the IDFG if adult steelhead arrive between January 1 and January 15 to determine whether to discontinue all main channel instream work with machinery until the following work season. Main channel instream work during these two weeks shall halt once adult steelhead have been observed until NOAA Fisheries verbally agrees that any construction activity would not be likely to adversely affect the adult steelhead.

   c. Confer with NOAA Fisheries and the IDFG on the presence of any chinook redds in the 12 Mile reach during the spawning season to determine if and how planned project activities can proceed during the construction season. If redds are present, construction shall not begin until NOAA Fisheries verbally agrees that activities would not be likely to adversely affect the redds.

   d. Monitor water quality for at least a half mile below project work to determine sediment levels.

   e. Allow NOAA Fisheries personnel to observe project activities when advance notice of at least 24 hours is provided.

2. To implement RPMs 2, above, the COE shall adhere to the specified work periods and notify NOAA Fisheries if salmonid life stages other than juveniles are found in the project area at unexpected times of year to determine how construction should proceed.

3. To implement RPMs 3, above, the COE shall follow the process for instream work as described on pages 10-11 of the BA.

4. To implement RPMs 4, above, the COE shall:

   a. Use turbidity curtains, where water velocities allow, to trap sediment and avoid adverse impacts to substrate.

   b. Use cofferdams and pumps, as described in the BA, to move water in side channels around the work site to avoid sediment problems.

   c. Limit instream work to four hours per day, if machine work produces unacceptable levels of sediment under the Clean Water Act.

   d. Minimize work along the stream banks to keep sediment, rock and other objects from entering the water and to minimize disruption to vegetation.

   e. Cease project operations under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

   f. For all water intakes used for a project, including pumps used to isolate an in-water work area, install a fish screen that is operated and maintained according to NOAA Fisheries' fish screen criteria (NMFS 1995; NMFS 1996a).

5. To implement RPMs 5, above, the COE shall:

   a. Ensure the work crew has been trained in fish salvage techniques to IDFG standards and has the proper authority to proceed with any necessary salvage of juvenile chinook salmon and steelhead.

   b. Slope the channel at the Hot Springs site from the wetland to the river in order to reduce the risk of stranding fish in this channel when the irrigation flows out of the wetland are turned off. Other channels shall be constructed according to the descriptions in the BA to ensure adequate fish passage.

6. To implement RPMs 6, above, the COE shall:

   a. Place spill kits for hazardous chemicals on all equipment, project vehicles, and in on-site construction offices.

b. Monitor daily for fluid spills from machinery and vehicles and contain and pick up spills immediately upon detection.

c. Keep spill kits immediately available for all instream work sites.

7. To implement RPMs 7, above, the COE shall:

   a. Follow the description of continuing construction activities on pages 8-9 of the BA.

   b. Perform separate consultation for major maintenance activities that have a Federal nexus. Specific activities requiring separate consultation are described in Section 1.2.5 and include removing deposition from channels and blockages of channel entrances; replacing and repositioning stones in the entrance rock sill structures; cleaning cobble beds to remove and/or replace cobbles; reconstructing fences; removing wetlands vegetative mat to maintain freeboard; removing sediment depositions from wetlands basin; and replacing weir, diversion, and fish screen structures. Any maintenance covered by this Opinion that is necessary five years after the date of signature also requires separate consultation.

8. All terms and conditions shall be included in any permit, grant, or contract issued for the implementation of the action described in this Opinion.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Statutory Requirements

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan.

Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that may adversely affect EFH (section 305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (section 305(b)(4)(B)).

The EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA section 3). For the purpose of interpreting this definition of EFH: waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g*., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

The EFH consultation with NOAA Fisheries is required for any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action may adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects on EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fishery Management Council (PFMC) has designated EFH for three species of Federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and action area are detailed above in Sections 1.2 and 1.3 of this document. The action area includes habitats that have been designated as EFH for various life-history stages of chinook salmon.

3.4 Effects of Proposed Action on EFH

The habitat requirements for chinook salmon have been evaluated and have been found to be the same as the habitat requirements for the Snake River spring/summer chinook salmon and Snake River Basin steelhead. As described in detail in Section 2.2.1 of this document, the proposed action may result in short- and long-term adverse effects on a variety of habitat parameters. These adverse effects are:

1. Increases in turbidity and the recruitment of fine sediments into the river during main channel work and when side channels are reconnected. This is considered a short-term adverse effect downstream of the USRC.

2. Potential degradation of water quality from a contaminant spill. This would likely have a short-term adverse effect, but there is some possibility for a long-term effect.

3. Temporary loss of potential rearing habitat by draining the existing pond at the Hot Springs site.

4. The possibility for fish strandings as water levels on side channels drop during drought conditions and at the Pennal Gulch site, where fish screens would be omitted. These are long-term effects.

5. Minimal short-term disruption to riparian vegetation.

An additional potential short-term adverse effect on EFH, not addressed in Section 2.2.1, includes:

6. A disruption of feeding habitat for fry and juvenile salmon associated with increases in turbidity interfering with visual predation and siltation decreasing benthic invertebrate production.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for chinook salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that may adversely affect EFH. NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the COE, and believes that these measures are sufficient to minimize, to the maximum extent practicable, EFH adverse effect 2. Although, these conservation measures are not sufficient to fully address the remaining adverse effects to EFH, specific Terms and Conditions outlined in Section 2.7.3 are generally applicable to designated EFH for chinook salmon, and do address these adverse effects. Consequently, NOAA Fisheries recommends that the following terms and conditions be implemented as EFH conservation measures.

1. Term and Condition 4 will minimize EFH adverse effects 1, 5 and 6.

2. Term and Condition 6 will minimize EFH adverse effect 2.

3. Term and Condition 5 will minimize EFH adverse effect 3.

4. Term and Condition 7 will minimize EFH adverse effect 4.

3.7 Statutory Response Requirement

Pursuant to the MSA (section 305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations
(50 CFR 600.920(l)).

4. REFERENCES

Bevan, D., J. Harville, P. Bergman, T. Bjornn, J. Crutchfield, P. Klingeman, and J. Litchfield. 1994. Snake River Salmon Recovery Team: Final Recommendations to National Marine Fisheries Service (NMFS).

Bisson, P. A., G. H. Reeves, R. E. Bilby, and R. J. Naiman. 1997. Watershed Management and Pacific Salmon: Desired Future Conditions. P. 447-474. In: Stouder, D.J., P.A. Bisson, and R.J. Naiman, eds. Pacific Salmon and Their Ecosystems: Status and Future Options. Chapman and Hall, New York.

BRT (Biological Review Team). 1998. Status Review Update for West Coast Chinook Salmon (*Oncorhynchus tshawytscha*) from Puget Sound, Lower Columbia River, Upper Willamette River, and UCR Spring-Run ESUs. West Coast Chinook Salmon BRT, Seattle, Washington.

Burgner, R. L. 1991. The life history of sockeye salmon (*Oncorhynchus neka*). In C. Groot and L. Margolis, editors. Life history of Pacific salmon. University of British Columbia Press, Vancouver, British Columbia.

Burgner, R.L., J.T. Light, L. Margolis, T. Okazaki, A. Tautz, and S. Ito. 1992. Distribution and origins of steelhead trout (*Oncorhynchus mykiss*) in offshore waters of the North Pacific Ocean. Int. North Pac. Fish. Comm. Bull. 51, 92 p.

Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarcino. 1996. Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA-NWFSC-27. Available from NOAA Fisheries, Northwest Fisheries Center, Coastal Zone and Estuaries Studies Division, 2725 Montlake Blvd., E., Seattle, Washington 98112-2097. 261 p.

Chapman, D.W. and K.P. McLeod. 1987. Development of criteria for fine sediments in the Northern Rockies Ecoregion. Work Assignment 2-73. Battelle Columbus Laboratories. EPA Contract No. 68-01-6986. 279 p.

Coutant, C.C. 1999. Perspectives on Temperature in the Pacific Northwest's Fresh Waters. Environmental Sciences Division Publication 4849 (ORNL/TM-1999/44), Oak Ridge National Laboratory, Oak Ridge, Tennessee. 108 p.

Curet, T., A. Brimmer, L. Zuckerman, J. Brimmer, D. Garcia, C. Rudeen, K. Forster, and B. Roberts. 2003. Upper Salmon Basin In-stream Work Windows (Draft). July 8. Upper Salmon Basin Watershed Project.

Federal Caucus. 2000. Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy. http://www.salmonrecovery.gov (December).

Fish Passage Center. 2001a. Adult Salmon Passage at Lower Granite Dam. http://www.fpc.org/adult_history/ytd-lgr.htm (14 July 2003).

Fish Passage Center. 2001b. Spring Migration 2001 in response to Request from Brian Allee (Memorandum from Michele DeHart). August 10. http://www.fpc.org/fpc_docs/200-01.pdf (14 July 2003).

Fish Passage Center. 2002. Fish Passage Center Smolt Data, Current and Historical. Available from: Fish Passage Center, 2501 S.W. First Ave., Suite 230, Portland, Oregon 97201-4752. 52 pp + appendices. Available online at: http://www.fpc.org/fpc_docs/Annual_FPC_Report/FPC2002_Annual_Report.pdf

Healey, M.C. 1991. Life history of chinook salmon. Pages 311-394 in C. Groot and L. Margolis (eds.), Pacific salmon life histories. Vancouver, BC: University of British Columbia Press.

Henjum, M.G., J.R. Karr, D.L. Bottom, D.A. Perry, J.C. Bednarz, S.G. Wright, S.A. Beckwitt, and E. Beckwitt. 1994. Interim Protection for Late-successional Forests, Fisheries and Watersheds. National Forests East of the Cascade Crest, Oregon and Washington. A Report to the United States Congress and the President. The Wildlife Society, Bethesda, Maryland.

Higginbotham, F.G. 2003. Biological Assessment for Birds, Mammals, and Fish in the Upper Salmon River at Challis Project. May 28. Prepared for the U.S. Army Corps of Engineers, Walla Walla, Washington.

IDEQ (Idaho Department of Environmental Quality). 2003. Upper Salmon River Subbasin Assessment and TMDL. January.

Independent Scientific Group. 1996. Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem. Northwest Power Planning Council. Portland, Oregon. 500 p.

Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, and J.E. Williams. 1997. Broadscale Assessment of Aquatic Species and Habitats. Volume III, Chapter 4. U.S. For. Serv., Gen. Tech. Rep. PNW-GTR-405. Portland, Oregon.

Maser, C. and J.R. Sedell. 1994. From the Forest to the Sea: The Ecology of Wood in Streams, Rivers, Estuaries, and Oceans. St. Lucie Press, Delray Beach, Florida.

Matthews, G.M. and R.S. Waples. 1991. Status Review for Snake River Spring and Summer Chinook Salmon. NMFS F/NWC/-200. Available from NOAA Fisheries, Northwest Fisheries Science Center, Coastal Zone and Estuaries Studies Division, 2725 Montlake Blvd., E., Seattle, Washington 98112-2097. 75 p.

McElhany, P., M. Ruckleshaus, M.J. Ford, T. Wainwright, and E. Bjorkstedt. 2000. Viable Salmon Populations and the Recovery of Evolutionarily Significant Units. U. S. Dept. Commerce, NOAA Technical Memorandum NMFS-NWFSC-42.

McIntosh, B.A., J.R. Sedell, J.E. Smith, R.C. Wissmar, S.E. Clarke, G.H. Reeves, and L.A. Brown. 1994. Management History of Eastside Ecosystems: Changes in Fish Habitat Over 50 Years, 1935 to 1992. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-321. February.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California. NMFS-NWFSC-35. Available from NOAA Fisheries, Northwest Fisheries Science Center, Coastal Zone and Estuaries Studies Division, 2725 Montlake Blvd. E., Seattle, Washington 98112-2097 or online. 443 p.

Naiman, R.J., T.J. Beechie, L.E. Benda, D.R. Berg, P.A. Bisson, L.H. MacDonald, M.D. O’Connor, P.L. Olson, and E.A. Steel. 1992. Fundamental Elements of Ecologically Healthy Watersheds in the Pacific Northwest Coastal Ecoregion. P. 127-188. In: R.S. Naiman, ed. Watershed Management — Balancing Sustainability and Environmental Change. Springer-Verlag, New York.

National Research Council. 1996. Upstream—Salmon and Society in the Pacific Northwest. National Academy Press, Washington, D.C.

Nehlsen, W. 1997. Prioritizing Watersheds in Oregon for Salmon Restoration. Restoration Ecology 5(4S):25-43.

NMFS (National Marine Fisheries Service). 1995. Juvenile Fish Screen Criteria. Environmental and Technical Services Division, Portland, Oregon. Rev. February 16, 1995. http://www.nwr.noaa.gov/1hydrop/nmfscrit1.htm (18 Aug 2003).

NMFS. 1996a. Addendum: Juvenile Fish Screen Criteria for Pump Intakes. Environmental and Technical Services Division, Portland, Oregon. Rev. May 9, 1996. http://www.nwr.noaa.gov/1hydrop/pumpcrit1.htm (18 Aug 2003).

NMFS. 1996b. Making Endangered Species Act Determinations of Effect for Individual and Grouped Actions at the Watershed Scale. Habitat Conservation Program, Portland, Oregon.

NMFS. 1999. The Habitat Approach. Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids. Northwest Region, Habitat Conservation and Protected Resources Divisions, August 26.

NMFS. 2000. Biological Opinion: Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin. Hydro Program, Portland, Oregon. (Issued December 21, 2000)

NMFS. 2001. Biological Opinion: East Birch Creek Fish Habitat Restoration Projects (Umatilla County, Ore.). Habitat Conservation Division, LaGrande Field Office. July 27.

Nordlund, B. 1996. Designing Fish Screens for Fish Protection at Water Diversions. National Marine Fisheries Service, Portland, Oregon. June 10, 1996. http://www.nwr.noaa.gov/1hydrop/hydroweb/docs/usfws_97.htm (18 Aug 2003).

Oregon Progress Board. 2000. Oregon State of the Environment Report 2000. Oregon Progress Board, Salem, Oregon.

PFMC (Pacific Fishery Management Council). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council, Portland, Oregon.

Regetz, J. 2003. Landscape-level constraints on recruitment of chinook salmon (*Oncorhynchus tshawytscha*) in the Columbia River basin, USA. Aquatic Conservation: Marine and Freshwater Ecosystems 13:35-49.

Rhodes, J.J., D.A. McCullough, and F.A. Espinosa, Jr. 1994. A Coarse Screening Process for Potential Application in ESA Consultations. Columbia River Intertribal Fish Commission. Prepared under NMFS/BIA Inter-Agency Agreement 40ABNF3. December.

Sedell, J.R. and J.L. Froggatt. 1984. Importance of Streamside Forests to Large Rivers: The Isolation of the Willamette River, Oregon, USA, from Its Floodplain by Snagging and Streamside Forest Removal. Internationale Vereinigung fur theoretische und angewandte Limnologie Verhandlungen 22:1828-1834.

Spence, B.C, G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon.

USRITAT (Upper Salmon River Interagency Technical Advisory Team). 1998. Upper Salmon River Key Watershed Bull Trout Problem Assessment (USRPA) (Draft). Idaho Dept. of Fish and Game, Boise, Idaho. 171 p.

Waples, R.S., J. Robert, P. Jones, B.R. Beckman, and G.A. Swan. 1991. Status Review for Snake River fall chinook salmon. NOAA Tech. Memo. NMFS F/NWC-201, 73 p. (Natl. Mar. Fish. Serv., Northwest Fisheries Science Center, Coastal Zone and Estuarine Studies Division, 2725 Montlake Blvd. E., Seattle, WA 98112-2097.)

Wissmar, R.C., J.E. Smith, B.A. McIntosh, H.W. Li, G.H. Reeves, and J.R. Sedell. 1994. Ecological Health of River Basins in Forested Regions of Eastern Washington and Oregon. Gen. Tech. Rep. PNW-GTR-326. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, Oregon. 65 p.

APPENDIX A - Objectives of the Basinwide Salmon Recovery Strategy

OBJECTIVES OF THE BASINWIDE SALMON RECOVERY STRATEGY AND FEDERAL AGENCY FCRPS COMMITMENTS AND INTERIM RECOVERY NUMBERS

Table of Contents

A. Overview of Appendix A

Appendix A outlines the objectives of the Basinwide Salmon Recovery Strategy (Recovery Strategy) and major federal agency commitments to support conservation of non-federal habitat and federal land management initiatives in Columbia River tributaries, mainstem, and estuary under the FCRPS biological opinion.

This appendix also includes interim abundance and productivity targets for Endangered Species Act (ESA) listed salmon and steelhead in the Interior Columbia Basin. These interim targets are only a starting point. NOAA's National Marine Fisheries Service (NOAA Fisheries) will replace these targets with scientifically more rigorous and comprehensive recovery goals using viability criteria developed through the Interior Columbia Technical Recovery Team (TRT) process that commenced in October, 2001.

B. Basinwide Salmon Recovery Strategy Objectives

! Biological Objectives

- Maintain and improve upon the current distribution of fish and aquatic species, and halt declining population trends within 5-10 years.
- Establish increasing trends in naturally-sustained fish populations in each subregion accessible to the fish and for each Evolutionarily Significant Unit (ESU) within 25 years.
- Restore distribution of fish and other aquatic species within their native range within 25 years (where feasible).
- Conserve genetic diversity and allow natural patterns of genetic exchange to persist.

! Ecological Objectives

- Prevent further degradation of tributary, mainstem and estuary habitat conditions and water quality.
- Protect existing high quality habitats.
- Restore habitats on a priority basis.

! Water Quality Objective

- In the long term, attain state and tribal water quality standards in all critical habitats in the Columbia River and Snake River basins.

C. Federal Agency Commitments

The federal agencies include: U. S. Forest Service (Forest Service), Bureau of Land Management (BLM), Bonneville Power Administration (BPA), NOAA Fisheries, U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), Bureau of Indian Affairs, Army Corps of Engineers (COE), and Bureau of Reclamation (BOR) (and, if appropriate, the Natural Resource Conservation Service (NRCS), the Farm Service Administration (FSA) and U. S. Geological Survey).

In the short term, federal land will be managed by current programs that protect important aquatic habitats. On the east side of the Cascades the Forest Service and BLM manage salmonid habitat according to PACFISH/INFISH, and on the west side of the Cascades the Forest Service and BLM manage salmonid habitat under the Northwest Forest Plan. PACFISH/INFISH and the Northwest Forest Plan aim to protect areas that contribute to salmonid recovery and improve riparian habitat and water quality throughout the Basin. To meet these objectives, the Northwest Forest Plan and PACFISH/INFISH:

- Establish watershed and riparian goals to maintain or restore all fish habitat
- Establish aquatic and riparian habitat management objectives
- Delineate riparian management areas
- Provide specific standards and guidelines for timber harvest, grazing, fire suppression and mining in riparian areas
- Provide a mechanism to delineate a system of key watersheds to protect and restore important fish habitats
- Use watershed analyses and subbasin reviews to set priorities and provide guidance on priorities for watershed restoration
- Provide general guidance on implementation and effectiveness monitoring
- Emphasize habitat restoration through such activities as closing and rehabilitating roads, replacing culverts, changing grazing and logging practices, and replanting native vegetation along streams and rivers.

In the longer term, management on the east side of the Cascades will be guided by the Interior Columbia Basin Ecosystem Management Project (ICBEMP) as that strategy is put in place.

The Forest Service and BLM have made the following commitments to ensure that federal land management under ICBEMP will help protect and recover listed fish (these principles may be adjusted by the ICBEMP NEPA process and Record of Decision):

- Retain or recharter the Interagency Implementation Team (IIT) (senior staff from BLM, Forest Service, USFWS, and NOAA Fisheries) or a similar interagency team to aid in the transition from interim aquatic management strategies and products developed by the IIT to the long term ICBEMP direction.

- Strategically focus Forest Service and BLM scarce restoration resources using broad scale aquatic/riparian restoration priorities to first secure federally-owned areas of high aquatic integrity and second, restore out from that core, rebuilding connected habitats that support spawning and rearing.

- Ensure that land managers consider the broad landscape context of site-specific decisions on management activities by requiring a hierarchically-linked approach to analysis at different geographic scales. This is important to ensuring that the type, location and sequencing of activities within a watershed are appropriate and done in the context of cumulative effects and broad scale issues, risks, opportunities and conditions.

- Cooperate with similar basin planning processes sponsored by the Northwest Power Planning Council, BPA and other federal agencies, states and tribes to identify habitat restoration opportunities and priorities. Integrate information from these processes into ICBEMP subbasin review when appropriate.

- Consult with NOAA Fisheries and USFWS on land management plans and actions that may affect listed fish species following the Streamlined Consultation Procedures for Section 7 of the Endangered Species Act, July 1999.

- Collaborate early and frequently with states, tribes, local governments and advisory councils in land management analyses and decisions.

- Cooperate with the other federal agencies (in particular NOAA Fisheries and USFWS), states and tribes in the development of recovery plans and conservation strategies for listed and proposed fish species. Require that land management plans and activities be consistent with approved recovery plans and conservation strategies.

- Collaborate with other federal agencies, states, tribes and local watershed groups in the development of watershed plans for both federal and non federal lands and cooperate in priority restoration projects by providing technical assistance, dissemination of information and allocation of staff, equipment and funds.

- Share information, technology and expertise, and pool resources, in order to make and implement better-informed decisions related to ecosystems and adaptive management across jurisdictional boundaries.

- Collaborate with other federal agencies, states and tribes to improve integrated application of agency budgets to maximize efficient use of funds towards high priority restoration efforts on both federal and non-federal lands.

- Collaborate with other federal agencies, states and tribes in monitoring efforts to assess if habitat performance measures and standards are being met.

- Require that land management decisions be made as part of an ongoing process of planning, implementation, monitoring and evaluation. Incorporate new knowledge into management through adaptive management.

- Enhance the existing organizational structure with an interagency basinwide coordinating group and a number of sub-regional interagency coordinating committees. These coordinating groups and committees will ensure the implementation of ecosystem-based management across federal agencies' administrative boundaries, resolve implementation issues, be responsible for data management and monitoring, and incorporate new information through adaptive management.

Bureau of Reclamation (BOR)

Tributary

1. In priority watersheds, address all flow, passage and diversion problems over 10 years by restoring tributary flows, screening and combining water diversions, reduce passage obstructions.

Priority subbasins, organized by ESU are:

Upper Columbia Spring Chinook and Steelhead:
    Methow
    Entiat
    Wenatchee

Snake River Fall and Spring/Summer Chinook and Steelhead:
    Lemhi
    Upper Salmon
    Middle Fork Clearwater
    Little Salmon

Mid-Columbia Chinook, and Steelhead:
- North Fork John Day
- Upper John Day
- Middle Fork John Day

Lower Columbia Chinook, Steelhead and Chum:
- Lewis
- Upper Cowlitz
- Willamette-Clackamas

Upper Willamette Chinook and Steelhead:
- Clackamas
- North Santiam
- McKenzie

Corresponding 2000 FCRPS Reasonable Prudent Alternative (RPA) Action- 149

2. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Mainstem

1. Study the feasibility (including both biological benefits and ecological risks) of habitat modification to improve spawning conditions for chum salmon in the Ives Island area.

The objectives of the study will be to determine whether it would be beneficial to increase the frequency of access to spawning habitat or the areal extent of spawning habitat by means other than flow augmentation. The feasibility study will evaluate actions to alter the hydraulic control points that limit flow in the Ives Island area to provide the same areal extent and quality of sustainable spawning habitat (including characteristics such as upwelling through the gravels currently present at the site) at lower levels of Bonneville discharge; reconstruct spawning channels to increase the extent of habitat available at a given level of Bonneville discharge; and maintain hydraulic connections between tributary habitats and the mainstem Columbia River to allow entry for adults and emergence channels for juveniles.

Corresponding 2000 FCRPS RPA Action- 156

Bonneville Power Administration (BPA)

Tributary

1. Restore tributary flows through a water brokerage. Beginning in 2001, BPA is to fund a project to experiment with innovative ways to increase tributary flows by, for example, establishing a water brokerage to increase flows. The project will also develop a plan for a pollution bank through which water quality credits could be exchanged in markets. The BPA also will fund the development of a methodology for ascertaining instream flows that meet ESA requirements.

Corresponding 2000 FCRPS RPA Action- 151

2. Support development of 303(d) lists and Clean Water Act (CWA) total maximum daily loads (TMDLs). The BPA and other Action Agencies (if it is within their jurisdiction) are to support the development of state or tribal 303(d) lists. Additionally, they are to provide funding to implement measures with direct ESA benefit in approved TMDLs and consult with state and tribal water quality entities to determine how water quality efforts can complement each other and avoid duplication.

Corresponding 2000 FCRPS RPA Action- 152

3. Fund efforts to protect currently productive non-Federal habitat in Subbasins with listed salmon and steelhead. The BPA is to place particular emphasis on protecting habitat that is at risk of being degraded, in accordance with criteria and priorities developed with NOAA Fisheries.

Corresponding 2000 FCRPS RPA Action- 150

4. Protect up to 100 stream miles per year. The BPA, working with agricultural incentive programs such as the Conservation Reserve Enhancement Program, will fund permanent or long-term protection for 100 miles of riparian buffers per year.

Corresponding 2000 FCRPS RPA Action- 153

5. Support Subbasin and Watershed Assessment and Planning. The BPA and the other Federal agencies will work with the Northwest Power Planning Council to develop and update subbasin assessments and plans. Complete preliminary subbasin assessments by early 2001, preliminary subbasin plans by 2002.

Corresponding 2000 FCRPS RPA Action- 154

6. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Mainstem

1. As lead agency: (1) develop a baseline data set; (2) develop and implement a habitat improvement plan that, insofar as possible, mimics the range and diversity of historic habitat conditions; and (3) develop and implement a rigorous monitoring and evaluation action plan that may lead to changes in the mainstem habitat program.

Corresponding 2000 FCRPS RPA Action- 155

2. Study the feasibility (including both biological benefits and ecological risks) of habitat modification to improve spawning conditions for chum salmon in the Ives Island area.

The objectives of the study will be to determine whether it would be beneficial to increase the frequency of access to spawning habitat or the areal extent of spawning habitat by means other than flow augmentation. The feasibility study will evaluate actions to alter the hydraulic control points that limit flow in the Ives Island area to provide the same areal extent and quality of sustainable spawning habitat (including characteristics such as upwelling through the gravels currently present at the site) at lower levels of Bonneville discharge; reconstruct spawning channels to increase the extent of habitat available at a given level of Bonneville discharge; and maintain hydraulic connections between tributary habitats and the mainstem Columbia River to allow entry for adults and emergence channels for juveniles.

Corresponding 2000 FCRPS RPA Action- 156

3. The BPA will fund actions to improve and restore tributary and mainstem habitat for Columbia River chum salmon in the reach between The Dalles Dam and the mouth of the Columbia River.   The purpose of this action is to compensate for effects of FCRPS water management in the Ives Island area, which appreciably diminish the value of critical spawning habitat for the survival and recovery of Columbia River chum salmon. The FCRPS has been a relatively important factor for decline of this ESU. Bonneville and The Dalles dams limit access to potential spawning habitat further upstream and Bonneville Reservoir drowned known historical habitat in Bonneville pool. Spawning is currently known in only two areas: the Grays River system in the Columbia River estuary and the Hardy/Hamilton creeks/Ives Island complex, downstream of Bonneville Dam.

Although most of the existing subbasin populations and the ESU as a whole are on a slightly positive growth trajectory (ESU-level lambda = 1.035), RPA water management operations will continue to limit the areal extent of spawning habitat in Bonneville pool and the Ives Island complex in most water years. Therefore, BPA will (1) fund surveys of existing and potential tributary and mainstem habitat in the Columbia River between The Dalles Dam and the mouth of the Columbia River for suitable protection and restoration projects, (2) develop and implement an effective habitat improvement plan, (3) protect, via purchase, easement, or other means, existing or potential spawning habitat in this reach and adjacent tributaries (i.e., protect, restore, and/or create potentially productive spawning areas). The overall goal of this effort will be to ensure the survival and recovery of Columbia River chum salmon by ensuring the availability of diverse, productive spawning habitats over a wide range of water years.

Corresponding 2000 FCRPS RPA Action- 157

Estuary

1. The BPA and the COE will seek funding and develop an action plan to rapidly inventory estuarine habitat, model physical and biological features of the historical lower river and estuary, identify limiting biological and physical factors in the estuary, identify impacts of the FCRPS system on habitat and listed salmon in the estuary relative to other factors, and develop criteria for estuarine habitat restoration.

RPA 158

2. The BPA and the COE, working with the Lower Columbia River Estuary Program (LCREP) and NOAA Fisheries, shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary.

Specific plans will be developed for salmon and steelhead habitat protection and enhancement. These plans should contain clear goals for listed salmon conservation in the estuary, identify habitats with the characteristics and diversity to support salmon productivity, identify potential performance measures, identify flow requirements to support estuarine habitat requirements for salmon, and develop a program of research, monitoring, and evaluation. The plans should be completed by 2003.

Corresponding 2000 FCRPS RPA Action- 159

3. The COE and BPA, working with LCREP, shall develop and implement an estuary restoration program with a goal of protecting and enhancing 10,000 acres of tidal wetlands and other key habitats over 10 years, beginning in 2001, to rebuild productivity for listed populations in the lower 46 river miles of the Columbia River.

Much of the complexity of the estuary's historic shallow-water habitat and much of the estuary's saltwater wetlands have been lost due to the effects of local, navigational, and hydropower development. The LCREP proposes a 10-year program to protect and enhance high-quality habitat on both sides of the river to support salmon rebuilding. A high priority should be put on tidal wetlands and other key habitats to rebuild productivity in the lower 46 river miles. Federal agencies will provide technical and financial support for this program and for efforts to implement on-the-ground activities identified in planning.

As more information is gained from inventory and analytical work, the 10,000-acre goal may be modified to ensure that habitats that are determined to be important to the survival and recovery of anadromous fish are addressed. Examples of acceptable estuary habitat improvement work include the following:

- Acquiring rights to diked lands
- Breaching levees
- Improving wetlands and aquatic plant communities
- Enhancing moist soil and wooded wetland via better management of river flows
- Reestablishing flow patterns that have been altered by causeways
- Supplementing the nutrient base by importing nutrient-rich sediments and large woody debris into the estuary
- Modifying abundance and distribution of predators by altering their habitat
- Creating wetland habitats in sand flats between the north and south channels
- Creating shallow channels in inter-tidal areas
- Enhancing connections between lakes, sloughs, side channels, and the main channel

Corresponding 2000 FCRPS RPA Action- 160

4. The BPA and NOAA Fisheries will develop a conceptual model of the relationship between estuarine conditions and salmon population structure and resilience. The model will highlight the relationship among hydropower, water management, estuarine conditions, and fish response. The work will enable the agencies to identify information gaps that have to be addressed to develop recommendations for FCRPS management and operations.

Corresponding 2000 FCRPS RPA Action- 162

5. The Federal agencies will develop performance measures for the actions taken in the estuary.

NOAA Fisheries

Tributary

1. Restore tributary flows through a water brokerage. NOAA Fisheries is a co-lead agency with BPA in this commitment. NOAA Fisheries and BPA will jointly decide whether to continue to fund this project beyond the $5 million per year base in years 2-5. NOAA Fisheries and BPA will also explore the possibility of integrating this project into the Northwest Power Planning Council's land and water trust fund.

Corresponding 2000 FCRPS RPA Action- 151

2. Protect currently productive habitat. Develop, with BPA, criteria and priorities for efforts to protect currently productive non-federal habitat.

3. Establish recovery objectives, de-listing criteria and recovery measures for the Upper Willamette, Lower Columbia, and Interior Columbia.

4. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Estuary

1. NOAA Fisheries, working with the BPA, the COE, and the LCREP, shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary.

Specific plans will be developed for salmon and steelhead habitat protection and enhancement. These plans should contain clear goals for listed salmon conservation in the estuary, identify habitats with the characteristics and diversity to support salmon productivity, identify potential performance measures, identify flow requirements to support estuarine habitat requirements for salmon, and develop a program of research, monitoring, and evaluation. The plans should be completed by 2003.

2. Support a Lower Columbia River Estuary Program (LCREP) designated entity to build a major information management and public education initiative through the LCREP to focus on endangered species, habitat loss and restoration, biological diversity and human activities that impact the river.

3. The BPA and NOAA Fisheries will develop a conceptual model of the relationship between estuarine conditions and salmon population structure and resilience. The model will highlight the

relationship among hydropower, water management, estuarine conditions, and fish response. The work will enable the agencies to identify information gaps that have to be addressed to develop recommendations for FCRPS management and operations.

4. The Federal agencies will develop performance measures for the actions taken in the estuary.

Environmental Protection Agency (EPA)

Tributary

1. Integration of the CWA TMDL process and the ESA. The EPA, NOAA Fisheries, USFWS and BPA will select pilot projects on the basis of nominations from Oregon, Washington and Idaho. These pilot projects would have the following objectives:

- Integrate CWA TMDL processes and ESA to avoid duplication of effort
- Develop one set of watershed goals that meet CWA and ESA requirements
- Provide CWA and ESA assurances to the extent allowable by law

Three TMDLs and implementation plans/Habitat Conservation Plans (HCPs) will be completed over three years.

2. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Farm Service Agency (FSA)

Tributary

1. Protect up to 100 stream miles per year. The BPA is to work with agricultural incentive programs such as the Conservation Reserve Enhancement Program, will fund long-term protection for 100 miles of riparian buffers per year.

U.S. Fish and Wildlife Service

Tributary

1. Integration of the CWA TMDL process and ESA. The EPA, NOAA Fisheries, USFWS and BPA will select pilot projects on the basis of nominations from Oregon, Washington and Idaho. These pilot projects would have the following objectives:

- Integrate CWA TMDL processes and ESA to avoid duplication of effort
- Develop one set of watershed goals that meet CWA and ESA requirements
- Provide CWA and ESA assurances to the extent allowable by law

Three TMDLs and implementation plans/HCPs will be completed over three years.

2. Federal agencies will develop an initial set of performance measures based on four key habitat factors: instream flows; amount and timing of sediment inputs to streams; riparian conditions that determine water quality, bank integrity, wood input and maintenance of channel complexity and habitat access. Changes in these attributes can be measured at the reach or the watershed level and aggregated to larger spatial scales to evaluate progress at the subbasin or basin level.

Estuary

1. The COE, with the USFWS will significantly reduce Caspian tern and cormorant predation on salmonids. In the short term, it will preclude Caspian tern nesting on Rice Island. For the long term, it will disperse the tern population to its range of historic nesting in Pacific states.

2. Support a LCREP designated entity to build a major information management and public education initiative through the LCREP to focus on endangered species, habitat loss and restoration, biological diversity and human activities that impact the river.

3. The Federal agencies will develop performance measures for the actions taken in the estuary.

U. S. Army Corps of Engineers (COE)

Tributary

1. The COE will use available funding and authorities to implement restoration actions in priority subbasins and in areas such as the Walla Walla basin, where water-diversion-related issues could cause take of listed species.

This requirement is not in the Basinwide Strategy but is found in RPA Action 149, 2000 FCRPS BiOp.

Mainstem

1. Study the feasibility (including both biological benefits and ecological risks) of habitat modification to improve spawning conditions for chum salmon in the Ives Island area.

The objectives of the study will be to determine whether it would be beneficial to increase the frequency of access to spawning habitat or the areal extent of spawning habitat by means other than flow augmentation. The feasibility study will evaluate actions to alter the hydraulic control points that limit flow in the Ives Island area to provide the same areal extent and quality of sustainable spawning habitat (including characteristics such as upwelling through the gravels currently present at the site) at lower levels of Bonneville discharge; reconstruct spawning channels to increase the extent of habitat available at a given level of Bonneville discharge; and maintain hydraulic connections between tributary habitats and the mainstem Columbia River to allow entry for adults and emergence channels for juveniles.

Corresponding 2000 FCRPS RPA Action- 156

Estuary

1. The BPA and the COE will seek funding and develop an action plan to rapidly inventory estuarine habitat, model physical and biological features of the historical lower river and estuary, identify limiting biological and physical factors in the estuary, identify impacts of the FCRPS system on habitat and listed salmon in the estuary relative to other factors, and develop criteria for estuarine habitat restoration.

Corresponding 2000 FCRPS RPA Action- 158

2. The COE (federal lead) and BPA, working with LCREP and NOAA Fisheries, shall develop a plan addressing the habitat needs of salmon and steelhead in the estuary.

Specific plans will be developed for salmon and steelhead habitat protection and enhancement. These plans should contain clear goals for listed salmon conservation in the estuary, identify habitats with the characteristics and diversity to support salmon productivity, identify potential performance measures, identify flow requirements to support estuarine habitat requirements for salmon, and develop a program of research, monitoring, and evaluation. The plans should be completed by 2003.

Corresponding 2000 FCRPS RPA Action- 159

3. The COE and BPA, working with LCREP, shall develop and implement an estuary restoration program with a goal of protecting and enhancing 10,000 acres of tidal wetlands and other key habitats over 10 years, beginning in 2001, to rebuild productivity for listed populations in the lower 46 river miles of the Columbia River.

Much of the complexity of the estuary's historic shallow-water habitat and much of the estuary's saltwater wetlands have been lost due to the effects of local, navigational, and hydropower development. The LCREP proposes a 10-year program to protect and enhance high-quality habitat on both sides of the river to support salmon rebuilding. A high priority should be put on tidal wetlands and other key habitats to rebuild productivity in the lower 46 river miles. Federal agencies will provide technical and financial support for this program and for efforts to implement on-the-ground activities identified in planning.

As more information is gained from inventory and analytical work, the 10,000-acre goal may be modified to ensure that habitats that are determined to be important to the survival and recovery of anadromous fish are addressed. Examples of acceptable estuary habitat improvement work include the following:

- Acquiring rights to diked lands
- Breaching levees
- Improving wetlands and aquatic plant communities
- Enhancing moist soil and wooded wetland via better management of river flows
- Reestablishing flow patterns that have been altered by causeways
- Supplementing the nutrient base by importing nutrient-rich sediments and large woody debris into the estuary
- Modifying abundance and distribution of predators by altering their habitat
- Creating wetland habitats in sand flats between the north and south channels
- Creating shallow channels in inter-tidal areas
- Enhancing connections between lakes, sloughs, side channels, and the main channel

Corresponding 2000 FCRPS RPA Action- 160

4. The COE, with the USFWS will significantly reduce Caspian tern and cormorant predation on salmonids. In the short term, it will preclude Caspian tern nesting on Rice Island. For the long term, it will disperse the tern population to its range of historic nesting in Pacific states.

5. Support a LCREP designated entity to build a major information management and public education initiative through the LCREP to focus on endangered species, habitat loss and restoration, biological diversity and human activities that impact the river.

6. The Federal agencies will develop performance measures for the actions taken in the estuary.

D. Interim Abundance and Productivity Targets for Pacific Salmon and Steelhead Listed under the Endangered Species Act in the Interior Columbia Basin

These interim abundance and productivity targets are provided for geographic spawning aggregations of naturally produced spawning adults. They address the portion of each ESU's historical range below the major mainstem dams that do not provide for fish passage (e.g., Chief Joseph Dam on the upper Columbia, Hells Canyon Dam on the Snake mainstem and Dworshak Dam on the north fork Clearwater River). The potential role of geographic spawning aggregations above these dams in the ESU's viability as a whole will be evaluated through the formal recovery planning process guided by recommendations from the Interior TRT.

It is important to note that these interim targets are not in the context of the whole ESUs, rather they are defined for tentative geographic spawning aggregations within the ESUs. The Interior TRT will develop more accurate population definitions to replace these preliminarily defined spawning aggregations. The TRT will also generate alternative delisting scenarios – different combinations of viable salmonid populations that would each provide for the recovery of the ESU as a whole.

Existing Delisting Objectives – Snake River spring/summer chinook, Snake River sockeye, Upper Columbia spring chinook and Upper Columbia steelhead

Recommended recovery objectives have been developed for Snake River spring/summer chinook spawning aggregations, Snake River fall chinook and Snake River sockeye by the Snake River Recovery Team (Bevan et al. 1994). Those recommendations were modified to apply to index stock areas[7] based on recommendations from the Idaho Department of Fish and Game (IDFG) v NOAA Fisheries Biological Requirements Workgroup (BRWG 1994) and were incorporated into the 1995 Proposed Snake River Recovery Plan (NMFS 1995). The targets were further modified based on input from the IDFG and were included in another draft recovery plan for Snake River Salmon (NMFS 1997). Population definitions and recommended abundance and productivity objectives have also been developed for upper Columbia spring chinook and steelhead ESU spawning aggregations in the Methow, Entiat, and Wenatchee through the Quantitiative Analytical Report (QAR) process (Ford et al. 2001). Ford et al. (2001) did not identify an abundance goal for the Okanogan due to a lack of sufficient historical information. However, the potential for naturally spawning aggregations in this area

[7] The index area recovery objectives were developed for use in assessing the status of Snake River spring chinook stocks. Index areas have established time-series of scientific observations (e.g., redd counts), and are generally smaller in scale than geographic spawning aggregations. Objectives for these specific index areas have played a key role in the recent series of Federal Hydropower system Biological Opinions (e.g., NMFS 2000; see section 1.3.1). Index area recovery objectives are included in Table 1(a).

will be evaluated by the Interior TRT. Tables 1(a) and 1(b) summarize those specific recommendations for interim targets for listed chinook and sockeye stocks in the upper Columbia and Snake River basins. Productivity criteria for Snake River sockeye were developed in the 2000 FCRPS BiOp (NMFS 2000) for a 40-48 year time period, recognizing the time required to institute habitat rehabilitation options and the time lag of response in the sockeye populations. However, to be consistent with the targets provided for the other ESUs, the productivity targets given for Snake River sockeye in Table 1(b) represent only a general biological rule of thumb over a time period of 8 years.

New Delisting Objectives – Interior Columbia Steelhead and Middle Columbia Steelhead ESU

Population definitions, abundance and productivity targets for Snake River and Middle Columbia steelhead have not been formally developed. For these ESUs, geographic spawning aggregations and interim abundance targets are based upon the QAR approach used in the Upper Columbia Biological Requirements Report (Ford et al. 2001), and from: descriptions in the 1990 Subbasin Plans; recommendations from state level stock surveys (e.g., ODFW 1995; WDFW 1993; IDFG 1985); NOAA Fisheries' Proposed Recovery Plan for Snake River Salmon (NMFS 1995); the 2000 Biological Opinion on the operation of the FCRPS (FCRPS BiOp) (NMFS 2000); and Oregon Department of Fish and Wildlife reports regarding conservation assessments (Chilcote 2001; ODFW 1995). Table 2 lists possible interim abundance targets and interim productivity objectives for major steelhead spawning aggregations in the Upper Columbia, the Middle Columbia and the Snake River ESUs. The abundance values listed for the Wenatchee, Entiat and Methow subbasins are the levels recommended through the QAR process (Ford et al. 2001). Productivity criteria for Snake River and mid-Columbia steelhead were developed in the 2000 FCRPS BiOp (NMFS 2000) for a 40-48 year time period, recognizing the time required to institute habitat rehabilitation options and the time lag of response in the steelhead populations. However, to be consistent with the targets provided for the other ESUs, the productivity targets given for Snake River and mid-Columbia steelhead in Table 2 represent only a general biological rule of thumb over a time period of 8 years.

Interim Targets – Description and Discussion of Caveats

<u>*Interim Abundance Targets*</u>

The enclosed Tables provide interim abundance targets generally representing the geometric mean of spawner escapement over time scales of eight years or approximately two generations. A challenge for co-managers, in the context of these interim abundance targets, is how to measure their progress toward recovery. Uncertainties associated with estimates of abundance and population trends must be considered when determining whether a population's recovery abundance goal has been met. These issues will need to be addressed in formal recovery planning.

Interim Productivity Objectives

In the long-term, a viable population will be characterized by a natural replacement rate (population growth rate) that fluctuates due to natural variability around an average of 1.0, but at an abundance high enough to provide a low risk of extinction. In many cases, spawner abundances are currently far below the levels required to minimize longer term risks of extinction. In those cases, average growth rates for spawner aggregations must exceed a 1:1 replacement rate until viable population abundance levels are achieved. These interim productivity and abundance targets should not be considered in isolation. A replacement rate >1 is indicative of a healthy population only if the abundance target has been achieved as well. However, a measure of the growth rate during the rebuilding/recovery phase may be most informative to subbasin planning groups in the near term, as population growth parameters are more reliably quantified than are abundance parameters. The enclosed Tables include recommendations of productivity objectives utilizing the above rules of thumb, as well as recommendations from the FCRPS BiOp (NMFS 2000), the QAR (Ford et al. 2001), and the Proposed Snake River Recovery Plan (NMFS 1995).

Interim Spatial Structure and Diversity Objectives

The provided interim abundance and productivity targets are just a start, and do not provide a comprehensive index of healthy populations. Typically, a recovered ESU would have healthy populations representative of all the major life history types, and of all the major ecological and geographic areas within an ESU. In the absence of specific diversity data about populations, conservation of habitat diversity might be used as a reasonable interim proxy. More specifically, the QAR Biological Requirements Report (Ford et al. 2001) developed the following objective for upper Columbia River populations: "In order to be considered completely recovered, spring chinook (and steelhead) populations should be able to utilize properly functioning habitat in multiple spawning streams within each major tributary, with patterns of straying among these areas free from human caused disruptions." Furthermore, the FCRPS BiOp (NMFS 2000) states that "... currently defined populations should be maintained to ensure adequate genetic and life history diversity as well as the spatial distribution of populations within each ESU." NOAA Fisheries recommends that these approaches be utilized in early Interior Columbia subbasin planning efforts.

Table 1(a). Interim Objectives – Listed Snake River and Upper Columbia Chinook ESUs[8]

Geographic Spawning Aggregations		Interim Abundance Targets[9]		Interim Productivity Objectives
***ESU*/Spawning Aggression**	**Index Areas**	**Spawning Aggregation**	**Index Areas**	
Upper Col. Spring Chinook ESU				Upper Col. Spring chinook populations are currently well below recovery levels. The geometric mean[10] Natural Replacement Rate (NRR) will therefore need to be greater than 1.0 (QAR recommendations; Ford et al. 2001)
Methow	Methow	2000	2000	
Entiat	Entiat	500	500	
Okanogan		– –[11]		
Wenatchee	Wenatchee	3750	3750	
Snake River Spring/Summer Chinook ESU				"For delisting to be considered, the eight year (approximately two generation) geometric mean cohort replacement rate of a listed species must exceed 1.0 during the eight years immediately prior to delisting. For spring/summer chinook salmon, this goal must be met for 80% of the index areas available for natural cohort replacement rate estimation." (Proposed Snake River Recovery Plan; NMFS 1995)
Tuccannon River		1000		
Grande Ronde River		2000		
	Minam		439	
Imnaha		2500		
	Mainstem		802	
Lower Mainstem tributaries		1000		
Little Salmon River Basin		1800		
Mainstem Salmon small trib's		700		
South Fork Salmon (Sum.)		9200		
	Johnson Cr.		288	

[8]These interim targets are derived from: Bevan et al. 1994; BRWG 1995; NMFS 1995; and NMFS 1997.

[9]Eight year, or approx. 2 generations, geometric mean of annual natural spawners. Abundance targets are also provided for smaller scale "Index Areas".

[10]Using the geometric mean as opposed to the arithmetic mean is a common practice when dealing with data series with inherently high annual variability. In the Columbia basin, the geometric mean has been used as a standard measure in the series of Biological Opinions issued covering the Federal Columbia River Power system (e.g., NMFS 2000, section 1.3) and in the upper Columbia QAR.

[11]Ford et al. (2001) did not identify an abundance goal for the Okanogan due to a lack of sufficient historical information. However, the potential for naturally spawning aggregations in this area will be evaluated by the Interior TRT.

Table 1(a) continued. Interim Objectives – Listed Snake River and Upper Columbia Chinook ESUs

Geographic Spawning Aggregations		Interim Abundance Targets		Interim Productivity Objectives
***ESU*/Spawning Aggression**	**Index Areas**	**Spawning Aggregation**	**Index Areas**	
Snake River Spring/Summer Chinook ESU (cont.)				*(see above)*
Middle Fork Salmon River		9300		
	Bear Valley/Elk		911	
	Marsh Creek		426	
Mainstem Trib's (Middle Fk. to Lemhi)		700		
Lemhi River		2200		
Pahsimeroi (Sum.)		1300		
Mainstem Trib's (Sum.) Lemhi to Redfish Lake Cr.		2000		
Mainstem Trib's (Spr.) Lemhi to Yahkee Fork		2400		
Upper East Fork Trib's (Spr.)		700		
Upper Salmon Basin (Spr.)		5100		

Table 1(b). Interim Objectives – Snake River Fall Chinook and Sockeye ESUs

ESU	**Interim Abundance Targets**[12]	**Interim Productivity Objectives**
Snake River Fall Chinook ESU	2500	"For delisting to be considered, the eight year (approximately two generation) geometric mean cohort replacement rate of a listed species must exceed 1.0 during the eight years immediately prior to delisting. For spring/summer chinook salmon,this goal must be met for 80% of the index areas available for natural cohort replacement rate estimation." (Proposed Snake River Recovery Plan; NMFS 1995)
Snake River Sockeye ESU	1000 spawners in one lake; 500 spawners per year in a second lake.	500 spawners per year in a second lake. The Snake River sockeye ESU is currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0.[13]

[12]These interim targets are derived from the Snake River Recovery Team recommendations included in the 1995 Proposed Snake River Recovery Plan (NMFS 1995). Eight year, or approx. 2 generations, geometric mean of annual natural spawners in the mainstem Snake River

[13]The 2000 FCRPS BiOp provided a productivity objective for Snake River sockeye, Snake River and Middle Columbia steelhead populations of "a median annual population growth rate (lambda) greater than 1.0 over a 40-48 year period." (NMFS 2000).

Table 2(a). Interim Objectives – Snake River Steelhead ESU[14]

***ESU*/Spawning Aggregations**	**Interim Abundance Targets**[15]	**Interim Productivity Objectives**
Snake River Steelhead ESU		Snake River ESU steelhead populations are currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0.
Tucannon R.	1300	
Asotin Cr.	400	
Grande Ronde		
Lower Gr. Ronde	2600	
Joseph Cr.	1400	
Middle Fork	2000	
Upper Mainstem	4000	
Imnaha	2700	
Clearwater River		
Mainstem	4900	
South Fork	3400	
Middle Fork	1700	
Selway R.	4900	
Lochsa R.	2800	
Salmon River		
Lower Salmon	1700	
Little Salmon	1400	
South Fork	4000	
Middle Fork	7400	
Upper Salmon	4700	
Lemhi	1600	
Pahsimeroi	800	

[14]These interim targets are derived from: Ford et al. 2001; Chilcote 2001; NMFS 1995; ODFW 1995; WDFW 1993; and IDFG 1985.

[15]Eight year, or approx. 2 generations, geometric mean of annual natural spawners.

Table 2(b). Interim Objectives – Upper & Middle Columbia River Steelhead ESUs[10]

***ESU*/Spawning Aggregations**	**Interim Abundance Targets**[11]	**Interim Productivity Objectives**
Upper Columbia Steelhead ESU		
Methow R.	2500	Geometric mean Natural Return Rate (NRR) should be 1.0 or greater over a sufficient number of years to achieve a desired level of statistical power. (QAR recommendations; Ford et al. 2001)
Entiat R.	500	
Okanogan R.	– –[12]	
Wenatchee R.	2500	
Middle Columbia Steelhead ESU		
Yakima River		Middle Columbia ESU steelhead populations are currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0.
Satus/Toppenish	2400	
Naches	3400	
Mainstem (Wapato to Roza)	1800	
Mainstem (Above Roza)	2900[13]	
Klickitat	3600	
Walla-Walla	2600	
Umitilla	2300	
Deschutes (Below Pelton Dam	6300	
John Day		
North Fork	2700	
Middle Fork	1300	
South Fork	600	
Lower John Day	3200	
Upper John Day	2000	

[10]These interim targets are derived from: Ford et al. 2001; and NMFS 2000.

[11]Eight year, or approx. 2 generations, geometric mean of annual natural spawners

[12]Ford et al. (2001) did not identify an abundance goal for the Okanogan due to a lack of sufficient historical information. However, the potential for naturally spawning aggregations in this area will be evaluated by the Interior TRT.

[13]NWPPC smolt capacity reduced by 50% to reflect shared production potential with resident form.

References

Bevan, D., J. Harville, P. Bergman, T. Bjornn, J. Crutchfield, P. Klingeman, and J. Litchfield. 1994. Snake River Recovery Team: Final Recommendations to the National Marine Fisheries Service, May 1994.

BRWG (Biological Requirements Workgroup). 1994. Progress report of the Biological Requirements Workgroup. Analytical methods for determining requirements of listed Snake River salmon relative to survival and recovery. October 13, 1994.

Chilcote, M.W. 2001 (Feb. Draft). Conservation assessment of steelhead populations in Oregon. Oregon Department of Fish and Wildlife Report, 86 pp.

Ford, M., P. Budy, C. Busack, D. Chapman, T. Cooney, T. Fisher, J. Geiselman, T. Hillman, J. Lukas, C. Peven, C. Toole, E. Weber, and P. Wilson. 2001. Upper Columbia River steelhead and spring chinook salmon population structure and biological requirements. NMFS, NWFSC. Upper Columbia River Steelhead and Spring Chinook Biological Requirements Committee Final Report.

IDFG. 1985. Anadromous Fish Management Plan, 1985. Idaho Department of Fish and Game.

NMFS. 1995. Proposed Recovery Plan for the Snake River. National Marine Fisheries Service, March, 1995.

NMFS. 1997. Snake River Salmon Recovery Plan - *Predecisional Document*. National Marine Fisheries Service.

NMFS. 2000. Federal Columbia River Power System Endangered Species Act Section 7Biological Opinion, 2000. National Marine Fisheries Service.

ODFW (Oregon Department of Fish and Wildlife). 1995. Comprehensive Plan For Production and Management of Oregon's Anadromous Salmon and Trout - Steelhead Plan Part III. Oregon Department of Fish and Wildlife, 1995.

WDFW (Washington Department of Fish and Wildlife). 1993. Washington State Salmon and Steelhead Stock Inventory (SASSI). Washington Department of Fish and Wildlife. Appendix 3: Columbia River Stocks, 580 pp.

APPENDIX B - Snake River Spring/Summer Chinook Salmon Status

BIOLOGICAL REQUIREMENTS, CURRENT STATUS, AND TRENDS:

SNAKE RIVER SPRING/SUMMER CHINOOK SALMON

1.1. Chinook Salmon Life History

Chinook salmon is the largest of the Pacific salmon. The species' distribution historically ranged from the Ventura River in California to Point Hope, Alaska, in North America, and in northeastern Asia from Hokkaido, Japan, to the Anadyr River in Russia (Healey 1991). Additionally, chinook salmon have been reported in the Mackenzie River area of northern Canada (McPhail and Lindsey 1970). Of the Pacific salmon, chinook salmon exhibit arguably the most diverse and complex life history strategies. Healey (1986), described 16 age categories for chinook salmon, seven total ages with three possible freshwater ages. This level of complexity is roughly comparable to that seen in sockeye salmon (Oncorhynchus nerka), although the latter species has a more extended freshwater residence period and uses different freshwater habitats (Miller and Brannon 1982, Burgner 1991). Two generalized freshwater
life-history types were initially described by Gilbert (1912): "stream-type" chinook salmon, which reside in freshwater for a year or more following emergence, and "ocean-type" chinook salmon, which migrate to the ocean within their first year. Healey (1983, 1991) has promoted the use of broader definitions for "ocean-type" and "stream-type" to describe two distinct races of chinook salmon. Healey's approach incorporates life history traits, geographic distribution, and genetic differentiation and provides a valuable frame of reference for comparisons of chinook salmon populations.

The generalized life history of Pacific salmon involves incubation, hatching, and emergence in freshwater; migration to the ocean; and the subsequent initiation of maturation and return to freshwater for completion of maturation and spawning. The juvenile rearing period in freshwater can be minimal or extended. Additionally, some male chinook salmon mature in freshwater, thereby foregoing emigration to the ocean. The timing and duration of each of these stages is related to genetic and environmental determinants and their interactions to varying degrees. Although salmon exhibit a high degree of variability in life-history traits, there is considerable debate as to what degree this variability is shaped by local adaptation or results from the general plasticity of the salmonid genome (Ricker 1972, Healey 1991, Taylor 1991). More detailed descriptions of the key features of chinook salmon life history can be found in Myers et al. (1998) and Healey (1991).

1.2. Population Dynamics, Distribution, Status and Trends

The following sections provide specific information on the distribution and population structure (size, variability, and trends of the stocks or populations) for the listed evolutionary significant unit (ESU). Most of this information comes from observations made in terminal, freshwater areas, which may be distinct from the action area. This focus is appropriate because the species status and distribution can only be measured at this level of detail as adults return to spawn.

1.2.1. Snake River Spring/Summer Chinook Salmon

The present range of spawning and rearing habitat for naturally-spawned Snake River spring/summer chinook salmon is primarily limited to the Salmon, Grande Ronde, Imnaha, and Tucannon Subbasins. Most Snake River spring/summer chinook salmon enter individual subbasins from May through September. Juvenile Snake River spring/summer chinook salmon emerge from spawning gravels from February through June (Perry and Bjornn 1991). Typically, after rearing in their nursery streams for about 1 year, smolts begin migrating seaward in April and May (Bugert et al. 1990; Cannamela 1992). After reaching the mouth of the Columbia River, spring/summer chinook salmon probably inhabit nearshore areas before beginning their northeast Pacific Ocean migration, which lasts 2 to 3 years. Because of their timing and ocean distribution, these stocks are subject to very little ocean harvest. For detailed information on the life history and stock status of Snake River spring/summer chinook salmon, see Matthews and Waples (1991), National Marine Fisheries Service (NMFS 1991), and 56 FR 29542
(June 27, 1991).

Bevan et al. (1994) estimated the number of wild adult Snake River spring/summer chinook salmon in the late 1800s to be more than 1.5 million fish annually. By the 1950s, the population had declined to an estimated 125,000 adults. Escapement estimates indicate that the population continued to decline through the 1970s. Returns were variable through the 1980s, but declined further in recent years. Record low returns were observed in 1994 and 1995. Dam counts were modestly higher from 1996 through 1998, but declined in 1999. For management purposes the spring and summer chinook in the Columbia River Basin, including those returning to the Snake River, have been managed as separate stocks. Historical databases, therefore, provide separate estimates for the spring and summer chinook components. Table 1 reports the estimated annual return of adult, natural-origin Snake River spring and summer chinook salmon returning to Lower Granite Dam since 1979.

Table 1. Estimates of Natural-Origin SR Spring/Summer Chinook Salmon Counted at Lower Granite Dam in Recent Years (Speaks 2000)

Year	Spring Chinook	Summer Chinook	Total
1979	2,573	2,712	5,285
1980	3,478	2,688	6,166
1981	7,941	3,326	11,267
1982	7,117	3,529	10,646
1983	6,181	3,233	9,414
1984	3,199	4,200	7,399
1985	5,245	3,196	8,441
1986	6,895	3,934	10,829
1987	7,883	2,414	10,297
1988	8,581	2,263	10,844
1989	3,029	2,350	5,379
1990	3,216	3,378	6,594
1991	2,206	2,814	5,020
1992	11,285	1,148	12,433
1993	6,008	3,959	9,967
1994	1,416	305	1,721
1995	745	371	1,116
1996	1,358	2,129	3,487
1997	1,434	6,458	7,892
1998	5,055	3,371	8,426
1999	1,433	1,843	3,276
		Recovery Esc Level	31,440

NOAA's National Marine Fisheries Service (NOAA Fisheries) set an interim recovery level for Snake River spring/summer chinook salmon (31,400 adults at Ice Harbor Dam) in its proposed recovery plan (NMFS 1995). The Snake River spring/summer chinook salmon ESU consists of 39 local spawning populations (subpopulations) spread over a large geographic area (Lichatowich et al. 1993). The number of fish returning to Lower Granite Dam is therefore divided among these subpopulations. The relationships between these subpopulations, and particularly the degree to which individuals may intermix is unknown. It is unlikely that all

39 are independent populations per the definition in McElhany et al. (2000), which requires that each be isolated such that the exchange of individuals between populations does not substantially affect population dynamics or extinction risk over a 100-year time frame. Nonetheless, monitoring the status of subpopulations provides more detailed information on the status of the species than would an aggregate measure of abundance.

Seven of these subpopulations have been used as index stocks for the purpose of analyzing extinction risk and alternative actions that may be taken to meet survival and recovery requirements. The Snake River Salmon Recovery Team selected these subpopulations primarily because of the availability of relatively long time series of abundance data. The Biological Requirements Work Group (BRWG 1994)) developed recovery and threshold abundance levels for the index stocks, which serve as reference points for comparisons with observed escapements (Table 2). The threshold abundances represent levels at which uncertainties (and thus the likelihood of error) about processes or population enumeration are likely to be biologically significant, and at which qualitative changes in processes are likely to occur. They were specifically not developed as indicators of pseudo-extinction or as absolute indicators of "critical" thresholds. In any case, escapement estimates for the index stocks have generally been well below threshold levels in recent years (Table 2).

Table 2. Number of Adult Spawners, Recovery Levels, and BRWG Threshold Abundance Levels

Brood year	Bear Valley	Marsh	Sulphur	Minam	Imnaha	Poverty Flats	Johnson
1979	215	83	90	40	238	76	66
1980	42	16	12	43	183	163	55
1981	151	115	43	50	453	187	102
1982	83	71	17	104	590	192	93
1983	171	60	49	103	435	337	152
1984	137	100	0	101	557	220	36
1985	295	196	62	625	699	341	178
1986	224	171	385	357	479	233	129
1987	456	268	67	569	448	554	175
1988	1109	395	607	493	606	844	332
1989	91	80	43	197	203	261	103
1990	185	101	170	331	173	572	141
1991	181	72	213	189	251	538	151
1992	173	114	21	102	363	578	180
1993	709	216	263	267	1178	866	357
1994	33	9	0	22	115	209	50
1995	16	0	4	45	97	81	20
1996	56	18	23	233	219	135	49
1997	225	110	43	140	474	363	236
1998	372	164	140	122	159	396	119
1999	72	0	0	96	282	153	49
2000	*58*	*19*	*24*	*240*	na	*280*	*102*
Recovery Level	**900**	**450**	**300**	**450**	**850**	**850**	**300**
BRWG Threshold	**300**	**150**	**150**	**150**	**300**	**300**	**150**

These values are for SR spring/summer chinook salmon index stocks. Spring chinook index stocks: Bear Valley, Marsh, Sulphur and Minam. Summer-run index stocks: Poverty Flats and Johnson. Run-timing for the Imnaha is intermediate. Estimates for 2000 (shown in italics) are based on the preseason forecast.

As of June 1, 2000, the preliminary final aggregate count for upriver spring chinook salmon at Bonneville Dam was 178,000, substantially higher than the 2000 forecast of 134,000[14]. This is the second highest return in 30 years (after the 1972 return of 179,300 adults). Only a small portion of

[14] Source: June 1, 2000, E-mail from R. Bayley (NMFS) to S. H. Smith (NMFS). "Spring chinook update (end-of-season at Bonneville Dam)."

these are expected to be natural-origin spring chinook destined for the Snake River (5,800). However, the aggregate estimate for natural-origin Snake River spring chinook salmon is substantially higher than the contributing brood year escapements. Comparable returns to the Columbia River mouth in 1995 and 1996 were 1,829 and 3,903, respectively. The expected returns to the index areas were estimated by multiplying the anticipated return to the river mouth by factors that accounted for anticipated harvest (approximately 9%), interdam loss (50%), prespawning mortality (10%), and the average proportion of total natural-origin spring chinook salmon expected to return to the index areas (14.3%). This rough calculation suggests that the returns to each index area would just replace the primary contributing brood year escapement (1996) (Table 2). These results also suggest that other areas may benefit more than the index areas in terms of brood year return rates. The index areas, on average, account for about 14% of the return of natural-origin spring chinook stocks to the Snake River. The substantial return of hatchery fish will also provide opportunities to pursue supplementation options designed to help rebuild natural-origin populations subject to constraints related to population diversity and integrity. For example, expected returns of the Tucannon River (500 listed hatchery and wild fish), Imnaha River (800 wild and 1,600 listed hatchery fish), and Sawtooth Hatchery (368 listed hatchery fish) all represent substantial increases over past years and provide opportunities for supplementation in the local basins designed to help rebuild the natural-origin stocks.

The 2000 forecast for the upriver summer chinook stocks is 33,300, which is again the second highest return in over 30 years, but with only a small portion (2,000) being natural-origin fish destined for the Snake River. The return of natural-origin fish compares to brood year escapements in 1995 and 1996 of 534 and 3,046 and is generally lower than the average returns over the last 5 years (3,466). The expect returns to the Poverty Flats and Johnson Creek index areas using methods similar to those described above indicates that returns will approximately double the returns observed during 1996, the primary contributing brood year (Table 2) and would be at least close to threshold escapement levels. Again, the substantial returns of hatchery fish can be used in selected areas to help rebuild at least some of the natural-origin stocks. Unfortunately, with the exception of the Imnaha, local brood stocks are not currently available for the spring and summer chinook index areas.

The probability of meeting survival and recovery objectives for Snake River spring/summer chinook under various future operation scenarios for the hydrosystem was analyzed through a process referred to as PATH (Plan for Analyzing and Testing Hypotheses). The scenarios analyzed focused on status quo management, and options that emphasized either juvenile transportation or hydro-project drawdown. PATH also included sensitivity analyses to alternative harvest rates and habitat effects. PATH estimated the probability of survival and recovery for the seven index stocks using the recovery and escapement threshold levels as abundance indicators. The forward simulations estimated the probability of meeting the survival thresholds after 24 and 100 years.

A 70% probability of exceeding the threshold escapement levels was used to assess survival. Recovery potential was assessed by comparing the projected abundance to the recovery abundance levels after 48 years. A 50% probability of exceeding the recovery abundance levels was used to evaluate recovery by comparing the eight-year mean projected abundance. In general, the survival and recovery standards were met for operational scenarios involving drawdown, but were not met under status quo management or for the scenarios that relied on juvenile transportation (Marmorek et al. 1998). If the most conservative harvest rate schedule was assumed, transportation scenarios came very close to meeting the survival and recovery standards.

For the Snake River spring/summer chinook ESU as a whole, NOAA Fisheries estimates the median population growth rate (lambda), from 1980-1994, ranges from 1.012 to 0.796 (Table 3), depending on the assumed success of hatchery fish spawning in the wild. Lambda decreases with increasing success of instream hatchery fish reproduction, compared to fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000). NOAA Fisheries estimated the risk of absolute extinction for the aggregate Snake River spring/summer chinook population to be zero in
24 years regardless of hatchery fish reproduction, and from 0.00 to 1.00 in 100 years, depending the success of instream hatchery fish reproduction (Table 3). This analysis period does not include the higher returns observed since 1996. Since 1996, the average proportional increase in hatchery fish compared to wild fish has been substantially greater, consequently, even though the number of recruits per spawner has increased for natural fish since lambda was calculated, the estimate of lambda for natural fish may actually decline from the values in Table 3, due to the disproportionate increase in hatchery fish.

Table 3. Annual rate of population change (λ) in Snake River Spring Chinook salmon, absolute risk of extinction (1 fish/generation), and risk of 90% decline in 24 and 100 years for the period 1980-1994†. The range of reported values assumes that hatchery-origin fish either do not contribute to natural production or are as productive as natural-origin spawners.

Model Assumptions	l	**Risk of Extinction**		**Probability of 90% decrease in stock abundance**	
		24 years	100 years	24 years	100 years
No Correction for Hatchery Fish	1.012	0.00	0.00	0.014	0.072
No Instream Hatchery Reproduction	0.964	0.00	0.04	0.002	0.914
Instream Hatchery Reproduction = Natural Reproduction	0.796	0.00	1.00	0.996	1.000

† From Table B-2a and B-2b. Cumulative Risk Initiative. September 5, 2000, revised appendix B (McClure et al. 2000).

1.2.2. Lower Snake River Subbasin

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the Lower Snake River is summarized from the Lower Snake Subbasin Biological Assessment (BLM 2000a).

1.2.2.1. Species Distribution

Spring/summer chinook salmon use the mainstem Snake River for upstream and downstream migration and, to a limited extent, juvenile rearing. Migrating adult salmon may use the Snake River for staging prior to migrating to natal streams to spawn. Accessible tributary streams are used for spawning and/or juvenile rearing when stream conditions are suitable. Asotin Creek is the only tributary stream that is currently used for spawning and rearing by chinook salmon. Juvenile rearing may occur at the mouth or lower reach of accessible tributary streams. The Snake River has elevated summer water temperatures that are sub-optimal for rearing, therefore, tributary streams provide cool water refugia for juveniles. Often these tributary streams may have low water barriers, but are accessible during high spring flows (i.e., June). Low numbers of rearing juvenile chinook salmon may be found in the lower reaches of larger tributary streams. It should be noted that other smaller accessible tributaries may potentially be used if stream conditions are favorable.

1.2.2.2. Location of Important Spawning and Rearing Areas

Asotin Creek is an important spawning and rearing watershed for spring/summer chinook in the Lower Snake River Subbasin. Historically, other larger tributaries within the subbasin (i.e., Captain John Creek) may have been used for spawning and rearing. Priority watersheds identified for spring/summer chinook salmon include Asotin and Captain John Creeks.

1.2.2.3. Conditions and Trend of Populations

The Bureau of Land Management (BLM) noted that current numbers of naturally spawning spring/summer chinook salmon in the Lower Snake River Subbasin are at all time lows, and the overall trend is downward. Asotin Creek is the only tributary stream that is used by chinook salmon for spawning. Current use of Asotin Creek by spring/summer chinook is at very low levels and does not have a stable return of adults (BLM 2000a).

1.2.3. Lower Salmon River Subbasin

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the Lower Salmon River is summarized from the Lower Salmon River Subbasin Biological Assessment (BLM 2000b), except where noted.

1.2.3.1. Species Distribution

Spring/summer chinook salmon use the mainstem Salmon River for upstream and downstream migration and, to a limited extent, juvenile rearing. Migrating adult salmon may use the Salmon River for staging prior to migrating to natal streams to spawn. Accessible tributary streams are used for spawning and/or juvenile rearing when stream conditions are suitable. Slate Creek and White Bird Creek are the only tributary streams that are currently used for spawning and rearing. Stray adult chinook salmon may be found occasionally in other tributary streams (i.e., John Day Creek and French Creek). Juvenile chinook salmon rearing may occur at the mouth or lower reach of accessible tributary streams. The Salmon River has elevated summer water temperatures that are sub-optimal for rearing, therefore, tributary streams may provide cool water refugia for juveniles. Often these tributary streams have low water barriers, but are accessible during high spring flows (i.e., June). Tributary streams that may be used by juvenile chinook salmon for rearing include China, Eagle, Deer, Cottonwood, Maloney, Deep, Rice, Rock, Skookumchuck, John Day, Race, Lake, Allison, Partridge, Elkhorn, and French Creeks. It should be noted that other smaller accessible tributaries may potentially be used if stream conditions are favorable.

1.2.3.2. Location of Important Spawning and Rearing Areas

Slate Creek and White Bird Creek are important spawning and rearing watersheds for spring/summer chinook salmon in the lower Salmon River drainage. Historically, other larger tributaries may have been used for spawning and rearing. Priority watersheds identified for spring/summer chinook salmon within the subbasin include China, Eagle, Deer, White Bird, Skookumchuck, Slate, John Day, Race, Partridge, and French Creeks.

1.2.3.3. Conditions and Trend of Populations

The BLM noted that current numbers of naturally spawning spring/summer chinook salmon in the Lower Salmon River Subbasin are at all time lows, and the overall trend is downward. Slate Creek is the only tributary stream that is used by chinook salmon annually for spawning. White Bird Creek may be used by stray adults on occasion, but such use is expected to be very low (BLM 2000b).

1.2.4. Little Salmon River Subbasin

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the Little Salmon River is summarized from the Little Salmon River Subbasin Biological Assessment (BLM 2000c), except where noted.

1.2.4.1. Species Distribution

Spring/summer chinook salmon occur in the lower portion of the Little Salmon River and its tributaries, downriver from barriers located on the mainstem at river mile (RM) 24. An 1879 account of a trip through the Little Salmon River valley stated: “That salmon did not come into the valley because of rapids and falls below apparently prevented them” (Wiley 1879). No recent or formal historic documentation exists for spring/summer chinook salmon using streams above the RM 21 barrier. Welsh et al. (1965), reports that no known passage by salmon or steelhead exists above the Little Salmon River falls (RM 21). Ineffectual fish passage facilities were constructed at the falls by the

Civilian Conservation Corps during the 1930s (Welsh et al. 1965). Streams and rivers providing spawning and rearing for spring/summer chinook salmon include the Little Salmon and Rapid Rivers, and Boulder, Hazard, and Hard Creeks. Mainstem Little Salmon River tributary streams providing potential rearing habitat at the mouth and/or lower reach area only (below barrier) include Squaw, Sheep, Hat, Denny, Lockwood, Rattlesnake, Elk, and Trail Creeks. These streams provide sub-optimal rearing habitat because of steep stream gradients, barriers, and small size of tributaries.

1.2.4.2. Location of Important Spawning and Rearing Areas

Priority watersheds for spring/summer chinook salmon in the Little Salmon River Subbasin include Rapid River and Boulder, Hazard, and Hard Creeks. These streams provide spawning and rearing habitat for spring/summer chinook salmon. Rapid River is a stronghold and key refugia area for spring/summer chinook salmon.

1.2.4.3. Conditions and Trend of Populations

The BLM noted that current numbers of naturally spawning spring/summer chinook salmon in the Little Salmon River Subbasin are at all time lows, and the overall trend is downward. The highest number of intercepted adult natural spawning chinook salmon counted at the Rapid River weir was 1,269 in 1985, and the lowest counted was 4 in 1997. In 1998, a total of 42 adult natural spawning chinook salmon were counted and in 1999 a total of nine natural spawning chinook salmon were counted (BLM 2000c).

1.2.5. Middle Salmon River Subbasin

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the Middle Salmon River is summarized from the Middle Salmon River and South Fork Salmon River Subbasins Biological Assessment (BLM 2000d), except where noted.

1.2.5.1. Species Distribution

Spring/summer chinook salmon use the mainstem Middle Salmon River for upstream and downstream passage. A limited amount of juvenile rearing may also occur in the Salmon River. Spawning and rearing for spring/summer chinook salmon occurs in lower Wind River and

Crooked, Bargamin, Chamberlain, and Horse Creeks. Other accessible tributaries may be used for juvenile rearing when flow conditions and water temperatures are acceptable. Use generally occurs in the mouth area or lower reaches of tributary streams.

1.2.5.2. Location of Important Spawning and Rearing Areas

Priority watersheds for spring/summer chinook salmon in the Middle Salmon River Subbasin include Bargamin and Warren Creeks. These streams provide spawning and rearing habitat for adult and juvenile spring/summer chinook salmon. Spring/summer chinook salmon juveniles were observed in Warren Creek from the mouth to RM 2.4 (USFS 1998). Raleigh (1995), conducted snorkeling surveys in Warren Creek in late August 1994, and found juvenile chinook salmon in the lower reach only (RM 2.4). Spring/summer chinook salmon may use the mouth area or lower reaches of accessible tributaries such as Carey, California, and Bear Creeks for rearing.

1.2.5.3. Conditions and Trend of Populations

The BLM noted that current numbers of naturally spawning spring/summer chinook salmon in the Middle Salmon River Subbasin are at all time lows, and the overall trend is downward (BLM 2000d).

1.2.6. South Fork Salmon River Subbasin

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the South Fork Salmon River is summarized from the Middle Salmon River and South Fork Salmon River Subbasins Biological Assessment (BLM 2000d), except where noted.

1.2.6.1. Species Distribution

Most spring/summer chinook salmon spawning areas within the South Fork Salmon River are found upstream of the confluence of the Secesh River and the South Fork Salmon River. The largest spawning concentration occurs in the Poverty Flats to Fourmile area and in Stolle Meadows.

1.2.6.2. Location of Important Spawning and Rearing Areas

Concentrated spawning areas for Snake River spring/summer chinook salmon are found in the Glory Hole, Oxbow, Lake Creek, and Dollar Creek areas, the Icehole area in Johnson Creek, and the Secesh Meadows in the Secesh River. Rearing and overwintering occurs throughout the South Fork Salmon River.

1.2.6.3. Conditions and Trend of Populations

Historically, the South Fork Salmon River was the single most important summer chinook spawning stream in the Columbia River Basin (Mallet 1974). Redd counts in the South Fork have declined from 3,505 redds in 1957, to 810 in 1992. The Secesh River and Lake Creek redd counts (combined) were more than 500 redds in 1960 and declined to a low of 10 redds in 1975. Counts of 112 redds in 1991 dropped to 28 redds in 1995 (IDFG 1995). Based on standard transects (IDFG 1992), chinook parr densities are estimated to be less than 15% of potential habitat carrying capacity.

1.2.7. Upper Salmon River Subbasin

Information on chinook salmon distribution, important watersheds, and conditions and trends in the Upper Salmon River is summarized from the Biological Opinion on Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest (NMFS 2002a), and the Biological Opinion on L3A Irrigation Diversion Modification in the Lemhi River (NMFS 2002b)

1.2.7.1. Species Distribution

Spring/summer chinook salmon in the Upper Salmon River Subbasin may occur in most of the accessible streams when stream conditions are suitable. Chinook salmon use the mainstem Salmon River for upstream and downstream passage. Spawning and rearing may also occur in the mainstem Salmon River. In addition, most accessible tributaries may be used by spring/summer chinook salmon for spawning and rearing.

1.2.7.2. Location of Important Spawning and Rearing Areas

Important spring/summer chinook salmon spawning and rearing areas in the Upper Salmon River Subbasin probably occurs in Yankee Fork Salmon, Pahsimeroi River, East Fork Salmon River, Lemhi River and Pole, Alturas Lake, Valley, and Loon Creeks.

1.2.7.3. Conditions and Trend of Populations

Compared to the greatly reduced numbers of returning adults for the last several decades, increased numbers of adult chinook salmon returned to the Upper Salmon River drainage in 2000 and 2001. These large returns are thought to be a result of favorable ocean conditions, and above average flows in the Columbia River Basin when the smolts migrated downstream. However, these large returns are only a fraction of the returns of the late 1800s. Recent increases in the population are not expected to continue, and the long-term trend for this species indicates a decline (NMFS 2002b).

1.3. References

Bevan, D., J. Harville, P. Bergman, T. Bjornn, J. Crutchfield, P. Klingeman, and J. Litchfield. 1994. Snake River Salmon Recovery Team: Final recommendations to National Marine Fisheries Service (NMFS). May.

BRWG (Biological Requirements Work Group). 1994. Progress report: Analytical methods fordetermining requirements of listed Snake River salmon relative to survival and recovery. BRWG for Idaho et al. v. NMFS et al., National Marine Fisheries Service (NMFS). October 13.

Bugert, R., P. LaRiviere, D. Marbach, S. Martin, L. Ross, and D. Geist. 1990. Lower SnakeRiver compensation plan salmon hatchery evaluation program. 1989 Annual Report to U.S. Fish and Wildlife Service (Cooperative Agreement 14-16-0001-89525).

Bureau of Land Management (BLM). 2000a. Lower Snake River Subbasin: Biological Assessment of Ongoing and Proposed Bureau of Land Management Activities on Sockeye Salmon, Fall Chinook Salmon, Spring/Summer Chinook Salmon, Steelhead Trout, Bull Trout, and BLM Sensitive Species. Cottonwood, Idaho.

Bureau of Land Management (BLM). 2000b. Lower Salmon River Subbasin: Biological Assessment of Ongoing and Proposed Bureau of Land Management Activities on Sockeye Salmon, Fall Chinook Salmon, Spring/Summer Chinook Salmon, Steelhead Trout, Bull Trout, and BLM Sensitive Species. Cottonwood, Idaho.

Bureau of Land Management (BLM). 2000c. Little Salmon River Subbasin: Biological Assessment of Ongoing and Proposed Bureau of Land Management Activities on Sockeye Salmon, Fall Chinook Salmon, Spring/Summer Chinook Salmon, Steelhead Trout, Bull Trout, and BLM Sensitive Species. Cottonwood, Idaho.

Bureau of Land Management (BLM). 2000d. Middle Salmon River and South Fork Salmon River Subbasins: Biological Assessment of Ongoing and Proposed Bureau of Land Management Activities on Sockeye Salmon, Fall Chinook Salmon, Spring/Summer Chinook Salmon, Steelhead Trout, Bull Trout, and BLM Sensitive Species. Cottonwood, Idaho.

Burgner, R. L. 1991. The life history of sockeye salmon (*Oncorhynchus nerka*). In C. Groot and L. Margolis, editors. Life history of Pacific salmon. University of British Columbia Press, Vancouver, British Columbia.

Cannamela, D. A. 1992. Potential impacts of releases of hatchery steelhead trout "smolts" on wild and natural juvenile chinook and sockeye salmon. Idaho Department of Fish and Game, White Paper, Boise, Idaho.

Gilbert, C. H. 1912. Age at maturity of Pacific coast salmon of the genus *Oncorhynchus*. Bulletin of the U.S. Fish Commission 32: 57-70.

Healey, M. C. 1983. Coastwide distribution and ocean migration patterns of stream-and oceantype chinook salmon, *Oncorhynchus tshawytscha*. Canadian Field-Naturalist 97: 427-433

Healey, M. C. 1986. Optimum size and age at maturity in Pacific salmon and effects of size selective fisheries. Canadian Special Publications Fisheries and Aquatic Sciences 89: 39-52.

Healey, M. C. 1991. Life history of chinook salmon (*Oncorhynchus tshawytscha*). Pages 311-393 in Groot, C. and L. Margolis, editors. Pacific salmon life histories. University of British Columbia Press, Vancouver, British Columbia.

Idaho Department of Fish and Game (IDFG). 1992. Redd surveys. McCall Subregion, McCall, Idaho.

Idaho Department of Fish and Game (IDFG). 1995. Redd surveys. McCall Subregion, McCall, Idaho.

Lichatowich, J. A., L. G. Gilbertson, and L. E. Mobrand. 1993. A concise summary of Snake River chinook production. Mobrand Biometrics, Inc., Vashon Island, Washington, to Snake River Salmon Recovery Team.

Mallet, J. 1974. Long range planning for salmon and steelhead in Idaho, Job 2. inventory of salmon and steelhead resources, habitat, use and demands. Job Performance Report, Project F-58-R-1, Idaho Department of Fish and Game, Boise, Idaho. 212p.

Marmorek, D. R., and C. N. Peters, editors. 1998. Plan for analyzing and testing hypotheses (PATH): Preliminary decision analysis report on Snake River spring/summer chinook ESSA Technologies Ltd., Vancouver, British Columbia.

Matthews, G. M., and R. S. Waples. 1991. Status review for Snake River spring and summer chinook salmon. National Marine Fisheries Service (NMFS), Northwest Fisheries Science Center, NOAA Technical Memorandum NMFS F/NWC-200, Seattle, Washington.

McClure, B. Sanderson, E. Holmes, C. Jordan, P. Kareiva, and P. Levin. 2000. Revised Appendix B of standardized quantitative analysis of the risks faced by salmonids in the Columbia River Basin. National Marine Fisheries Service (NMFS), Northwest Fisheries Science Center, Seattle, Washington. September.

McElhany, P., M. Ruckelshaus, M. J. Ford, T. Wainwright, and E. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionary significant units. National Marine Fisheries Service (NMFS), Northwest Fisheries Science Center, Draft Report, Seattle, Washington. January 6.

McPhail, J. D., and C. C. Lindsey. 1970. Freshwater fishes of Northwestern Canada and Alaska. Bulletin of the Fisheries Research Board of Canada 173:381.

Miller, R. J., and E .L. Brannon. 1982. The origin and development of life-history patterns in Pacific salmon. In E. L. Brannon and E. O. Salo, editors. Proceedings of the salmon and trout migratory behavior symposium. University of Washington Press, Seattle, Washington.

Myers, J. M., R. G. Kope, G. J. Bryant, L. J. Lierheimer, R. S. Waples, R. W. Waknitz, T. C. Wainwright, W. S. Grant, K. Neely, and S. T. Lindley. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. National Marine Fisheries Service (NMFS), Northwest Fisheries Science Center, NOAA Technical Memorandum NMFSNWFSC-35, Seattle, Washington.

National Marine Fisheries Service (NMFS). 1991. Factors for decline: A supplement to the notice of determination for Snake River fall chinook salmon under the Endangered Species Act. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Protected Resources Division, Portland, Oregon. June.

NMFS. 1995. Proposed recovery plan for Snake River salmon. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Protected Resources Division, Portland, Oregon.

NMFS. 2002a. Biological Opinion on Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest. Endangered Species Act Section 7 Consultation. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, Washington.

NMFS. 2002b. Biological Opinion on L3A Irrigation Diversion Modification in the Lemhi River, Lemhi County, Idaho. Endangered Species Act Section 7 Consultation. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, Washington.

Peery, C. A., and T. C. Bjornn. 1991. Examination of the extent and factors affecting downstream emigration of chinook salmon fry from spawning grounds in the upper Salmon River. Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho, Unpublished Report, Moscow, Idaho.

Raleigh, R. 1995. Warren Creek drainage stream inventory report. Payette National Forest, McCall Ranger District. 1993-1995, Contract # 53-0256-3-21, Volume 1: Warren Creek and Lower Altitude Tributaries. McCall Ranger District, McCall, Idaho.

Ricker, W. E. 1972. Hereditary and environmental factors affecting certain salmonid populations. In R. C. Simon and P. A. Larkin, editors. The stock concept in Pacific salmon. MacMillan Lectures in Fisheries, University of British Columbia, Vancouver, British Columbia.

Speaks, S. 2000. Biological assessment of incidental impacts on salmon species listed under theEndangered Species Act in treaty Indian mainstem and tributary fisheries in the Columbia River Basin between January 1 and July 31, 2000.

Taylor, E. B. 1991. A review of local adaptation in Salmonidae, with particular reference to Pacific and Atlantic salmon. Aquaculture 98: 185-207.

USFS (U.S. Forest Service). 1998. Biological Assessment for the potential effects of managing the Payette National Forest in Main Salmon River Tributary Watersheds (Little Salmon River to South Fork Salmon River) on Snake River spring/summer chinook salmon and Snake River steelhead, Volume XII: ongoing activities. Payette National Forest, McCall, Idaho.

Welsh, T.L., S.V. Gebhards, H.E. Metsker, and R.V. Corning. 1965. Inventory of Idaho streams containing anadromous fish, including recommendations for improving production of salmon and steelhead - Part I Snake, Salmon, Weiser, Payette, and Boise River Drainages. Idaho State Fish and Game Department.

Wiley, N.B. 1879. Little Salmon Valley. In The Idaho Statesman, May 3, 1879, Boise, Idaho.

APPENDIX C - Snake River Steelhead Status

BIOLOGICAL REQUIREMENTS, CURRENT STATUS, AND TRENDS:

SNAKE RIVER STEELHEAD

1.1. General Life History

Steelhead can be divided into two basic run-types based on the state of sexual maturity at the time of river entry and the duration of the spawning migration (Burgner et al. 1992). The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in freshwater to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns shortly after river entry (Barnhart 1986). Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, while others only have one run-type.

In the Pacific Northwest, summer steelhead enter fresh water between May and October (Busby et al. 1996; Nickelson et al. 1992). During summer and fall, prior to spawning, they hold in cool, deep pools (Nickelson et al. 1992). They migrate inland toward spawning areas, overwinter in the larger rivers, resume migration in early spring to natal streams, and then spawn (Meehan and Bjornn 1991; Nickelson et al. 1992). Winter steelhead enter fresh water between November and April (Busby et al. 1996; Nickelson et al. 1992), migrate to spawning areas, and then spawn in late winter or spring. Some adults, however, do not enter coastal streams until spring, just before spawning (Meehan and Bjornn 1991). Difficult field conditions (snowmelt and high stream flows) and the remoteness of spawning grounds contribute to the relative lack of specific information on steelhead spawning.

Steelhead are iteroparous, or capable of spawning more than once before death. However, it is rare for steelhead to spawn more than twice before dying and most that do so are females (Nickelson et al. 1992). Iteroparity is more common among southern steelhead populations than northern populations (Busby et al. 1996). Multiple spawnings for steelhead range from 3% to 20% of runs in Oregon coastal streams.

Steelhead spawn in cool, clear streams containing suitable gravel size, depth, and current velocity. Intermittent streams may also be used for spawning (Barnhart 1986; Everest 1973). Steelhead enter streams and arrive at spawning grounds weeks or even months before they spawn and are vulnerable to disturbance and predation. Cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and turbidity (Giger 1973) are required to reduce disturbance and predation of spawning steelhead. Summer steelhead usually spawn further upstream than winter steelhead (Withler 1966; Behnke 1992).

Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months (August 9, 1996, 61 FR 41542) before hatching. Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson et al. 1992).

Juveniles rear in fresh water from 1 to 4 years, then migrate to the ocean as smolts. Winter steelhead populations generally smolt after 2 years in fresh water (Busby et al. 1996). Steelhead typically reside in marine waters for 2 or 3 years prior to returning to their natal stream to spawn at 4 or 5 years of age. Populations in Oregon and California have higher frequencies of age-1-ocean steelhead than populations to the north, but age-2-ocean steelhead generally remain dominant (Busby et al. 1996). Age structure appears to be similar to other west coast steelhead, dominated by 4-year-old spawners (Busby et al. 1996).

Based on purse seine catches, juvenile steelhead tend to migrate directly offshore during their first summer rather than migrating along the coastal belt as do salmon. During fall and winter, juveniles move southward and eastward (Hartt and Dell 1986).

1.2. Population Dynamics and Distribution

The following section provides specific information on the distribution and population structure (size, variability, and trends of the stocks or populations) of the Snake River ESU. Most of this information comes from observations made in terminal, freshwater areas, which may be distinct from the action area. This focus is appropriate because the species status and distribution can only be measured at this level of detail as adults return to spawn.

The longest consistent indicator of steelhead abundance in the Snake River Basin is based on counts of natural-origin steelhead at the uppermost dam on the lower Snake River (Lower Granite Dam). The abundance of natural-origin summer steelhead at the uppermost dam on the Snake River has declined from a 4-year average of 58,300 in 1964 to an average of 8,300 ending in 1998. In general, steelhead abundance declined sharply in the early 1970s, rebuilt modestly from the mid-1970s through the 1980s, and again declined during the 1990s (Figure 1).

These broad scale trends in the abundance of steelhead were reviewed through the Plan for analyzing and testing hypotheses (PATH) process. The PATH report concluded that the initial, substantial decline coincided with the declining trend in downstream passage survival. However, the more recent decline in abundance, observed over the last decade or more, does not coincide with declining passage survival, but can be at least partially accounted for by a shift in climatic regimes that has affected ocean survival (Marmorek and Peters 1998).

B-run steelhead are distinguished from the A-run component by their unique life history characteristics. B-run steelhead were traditionally distinguished as larger and older, later-timed fish that return primarily to the South Fork Salmon, Middle Fork Salmon, Selway, and Lochsa rivers. The recent All Species Review by the Technical Advisory Committee (TAC) concluded that different populations of steelhead do have different size structures, with populations dominated by larger fish (i.e., greater than 77.5 cm) occurring in the traditionally defined B-run basins (TAC 1999). Larger fish occur in other populations throughout the basin, but at much lower rates (evidence suggests that fish returning to the Middle Fork Salmon and Little Salmon are intermediate in that they have a more equal distribution of large and small fish).

B-run steelhead are also generally older. A-run steelhead are predominately age-1-ocean fish, whereas most B-run steelhead generally spend two or more years in the ocean prior to spawning. The differences in ocean age are primarily responsible for the differences in the size of A- and B-run steelhead. However, B-run steelhead are also thought to be larger at the same age than A-run fish. This may be due, in part, to the fact that B-run steelhead leave the ocean later in the year than A-run steelhead and thus have an extra month or more of ocean residence at a time when growth rates are thought to be greatest.

Historically, a distinctly bimodal pattern of freshwater entry could be used to distinguish A-run and B-run fish. A-run steelhead were presumed to cross Bonneville Dam from June to late August whereas B-run steelhead enter from late August to October. The TAC reviewed the available information on timing and confirmed that the majority of large fish do still have a later timing at Bonneville; 70% of the larger fish crossed the dam after August 26, the traditional cutoff date for separating A- and B-run fish (TAC 1999). However, the timing of the early part of the A-run has shifted somewhat later, thereby reducing the timing separation that was so apparent in the 1960s and 1970s. The timing of the larger, natural-origin B-run fish has not changed.

The abundance of A-run versus B-run components of Snake River Basin steelhead can be distinguished in data collected since 1985. Both components have declined through the 1990s, but the decline of B-run steelhead has been more significant. The 4-year average counts at Lower Granite Dam declined from 18,700 to 7,400 beginning in 1985 for A-run steelhead and from 5,100 to 900 for B-run steelhead. Counts over the last 5 or 6 years have been stable for A-run steelhead and without significant trend (Figure 2). Counts for B-run steelhead have been low and highly variable, but also without apparent trend (Figure 3).

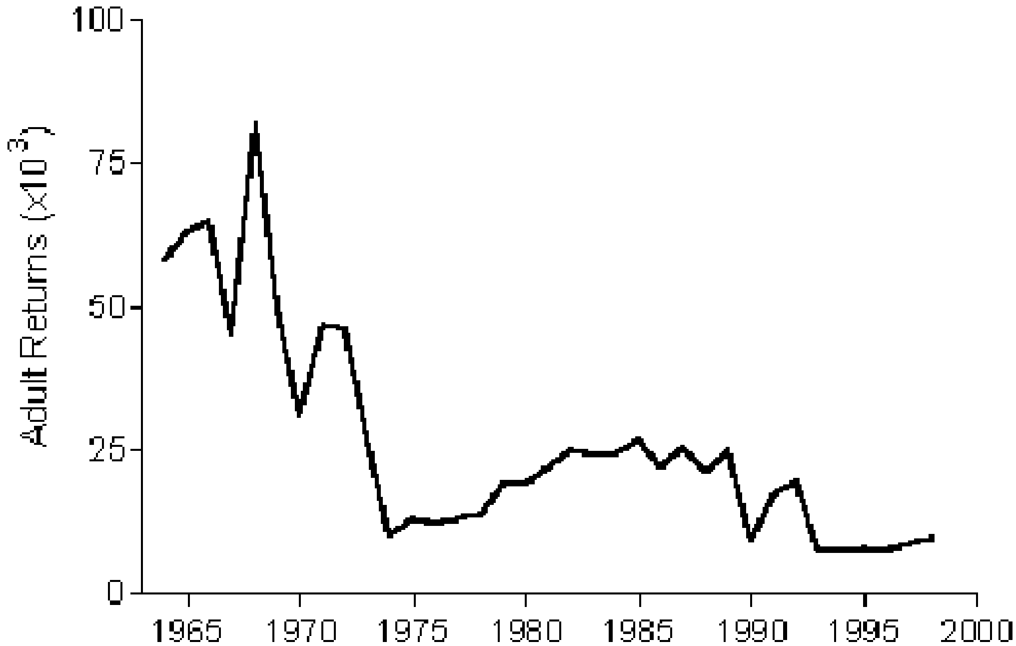
Comparison of recent dam counts with escapement objectives provides perspective regarding the status of the evolutionary significant unit (ESU). The management objective for Snake River steelhead stated in the Columbia River Fisheries Management Plan was to return 30,000 natural/wild steelhead to Lower Granite Dam. The All Species Review (TAC 1997) further clarified that this objective was subdivided into 20,000 A-run and 10,000 B-run steelhead. Idaho has reevaluated these escapement objectives using estimates of juvenile production capacity. This alternative methodology lead to revised estimates of 22,000 for A-run and 31,400 for B-run steelhead (pers. comm., S. Keifer, Idaho Department of Fish and Game with P. Dygert, NOAA's National Marine Fisheries Service).

The State of Idaho has conducted redd count surveys in all of the major subbasins since 1990. Although the surveys are not intended to quantify adult escapement, they can be used as indicators of relative trends. The sum of redd counts in natural-origin B-run production subbasins declined from 467 in 1990 to 59 in 1998 (Figure 4). The declines are evident in all four of the primary B-run production areas. Index counts in the natural-origin A-run production areas have not been conducted with enough consistency to permit similar characterization.

Idaho has also conducted surveys for juvenile abundance in index areas throughout the Snake River Basin since 1985. Parr densities of A-run steelhead have declined from an average of about 75% of carrying capacity in 1985 to an average of about 35% in recent years through 1995 (Figure 5). Further declines were observed in 1996 and 1997. Parr densities of B-run steelhead have been low, but relatively stable since 1985, averaging 10% to 15% of carrying capacity through 1995. Parr densities in B-run tributaries declined further in 1996 and 1997 to 11% and 8%, respectively.

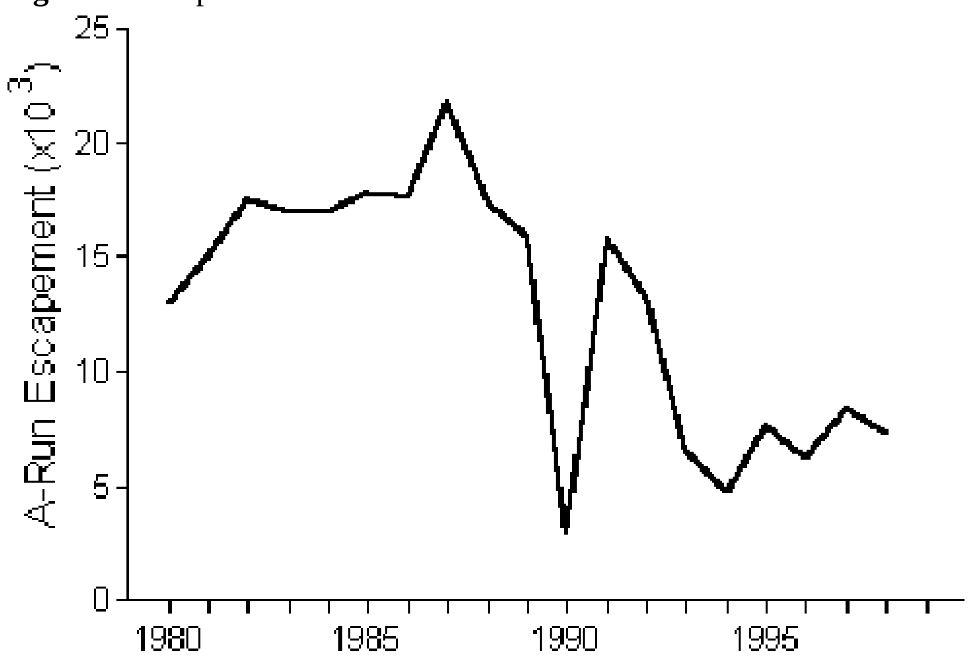
It is apparent from the available data that B-run steelhead are much more depressed than the A-run component. In evaluating the status of the Snake River Basin steelhead ESU, it is pertinent to consider if B-run steelhead represent a "significant portion" of the ESU. This is particularly relevant because the Tribes have proposed to manage the Snake River Basin steelhead ESU as a whole without distinguishing between components, and further, that it is inconsistent with NOAA’s National Marine Fisheries Service (NOAA Fisheries) authority to manage for components of an ESU.

Figure 1. Adult Returns of Wild Summer Steelhead to Lower Granite Dam on the Snake River.



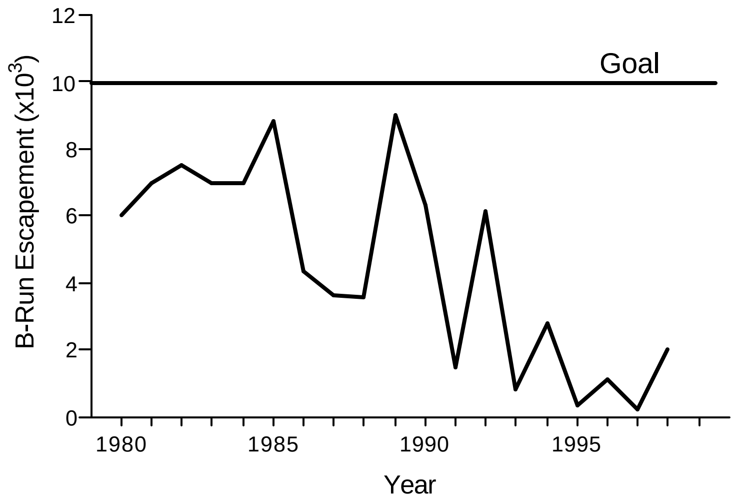
Source: Escapement through 1995 from TAC (1997); escapement for 1996–1998 from pers. comm. G. Mauser (IDFG).

Figure 2. Escapement of A-Run Snake River Steelhead to Lower Granite Dam.



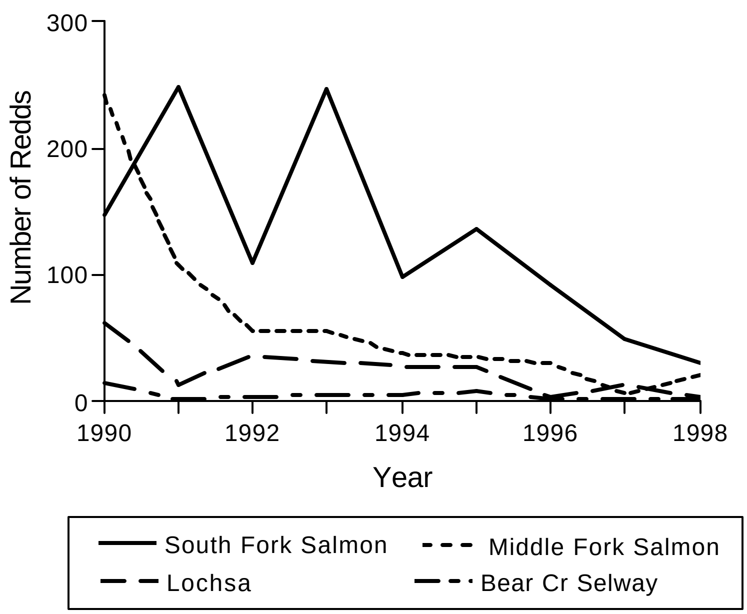
Source: Data for 1980 through 1984 from Figures 1 and 2 of Section 8 in TAC (1997). Data for 1985 through 1998 from Table 2 of Section 8
(TAC 1997) and pers. comm . G. Mauser, (IDFG).

Figure 3. Escapement of B-Run Snake River Steelhead to Lower Granite Dam.



Source: Data for 1980 through 1984 from Figures 1 and 2 of Section 8 in TAC (1997). Data for 1985 through 1998 from Table 2 of Section 8
(TAC 1997) and pers. comm. G. Mauser (IDFG).

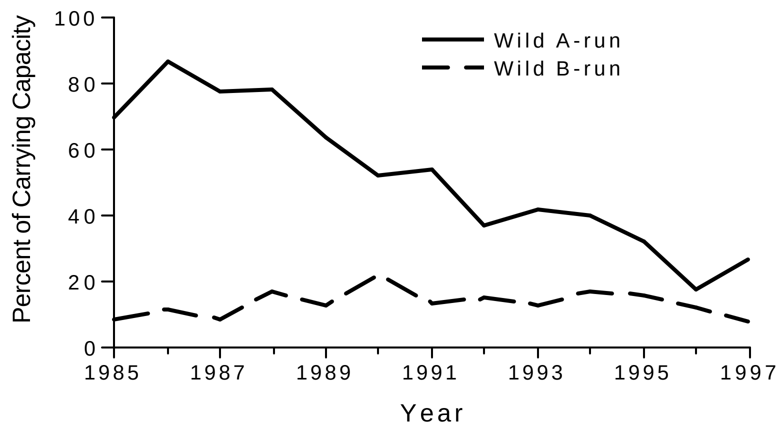
Figure 4. Redd Counts for Wild Snake River (B-Run) Steelhead in the South Fork and Middle Fork Salmon, Lochsa, and Bear Creek-Selway Index Areas.



Data for the Lochsa exclude Fish Creek and Crooked Fork.

Sources: memo from T. Holubetz (IDFG), "1997 Steelhead Redd Counts", dated May 16, 1997, and IDFG (unpublished).

Figure 5. Estimated Carrying Capacity for Juvenile (Age-1+ and -2+) Wild-A and B-Run Steelhead in Idaho Streams



Source: Data for 1985 through 1996 from (Hall-Griswold and Petrosky 1998); data for 1997 from IDFG (unpublished).

It is first relevant to put the Snake River basin into context. The Snake River historically supported over 55% of total natural-origin production of steelhead in the Columbia River Basin and now has approximately 63% of the basin's natural production potential (Mealy 1997). B-run steelhead occupy four major subbasins including two on the Clearwater River (Lochsa and Selway) and two on the Salmon River (Middle Fork and South Fork Salmon), areas that for the most part are not occupied by A-run steelhead. Some natural B-run steelhead are also produced in parts of the mainstem Clearwater and its major tributaries. There are alternative escapement objectives for B-run steelhead of 10,000 (TAC 1997) and 31,400 (Idaho). B-run steelhead, therefore, represent at least 1/3 and as much as 3/5 of the production capacity of the ESU.

As pointed out above, the geographic distribution of B-run steelhead is restricted to particular watersheds within the Snake River Basin (areas of the mainstem Clearwater, Selway, and Lochsa Rivers and the South and Middle Forks of the Salmon River). No recent genetic data are available for steelhead populations in South and Middle Forks of the Salmon River. The Dworshak National Fish Hatchery (NFH) stock and natural populations in the Selway and Lochsa Rivers are thus far the most genetically distinct populations of steelhead in the Snake River Basin (Waples et al. 1993). In addition, the Selway and Lochsa River populations from the Middle Fork Clearwater appear to be very similar to each other genetically, and naturally produced rainbow trout from the North Fork Clearwater River (above Dworshak Reservoir) clearly show an ancestral genetic similarity to Dworshak NFH steelhead. The existing genetic data, the restricted geographic distribution of B-run steelhead in the Snake (Columbia) River Basin, and the unique life history attributes of these fish (i.e. larger, older adults with a later distribution of run timing compared to A-run steelhead in other portions of the Columbia River Basin) clearly support the conservation of B-run steelhead as a biologically significant component of the Snake River ESU.

Another approach to assessing the status of an ESU being developed by NOAA Fisheries is to consider the status of its component populations. For this purpose a population is defined as a group of fish of the same species spawning in a particular lake or stream (or portion thereof) at a particular season, which to a substantial degree do not interbreed with fish from any other group spawning in a different place or in a the same place at a different season. Because populations as defined here are relatively isolated, it is biologically meaningful to evaluate the risk of extinction of one population independently from any other. Some ESUs may be comprised of only one population whereas others will be constituted by many. The background and guidelines related to the assessment of the status of populations is described in a recent draft report discussing the concept of viable salmonid populations (McElhany et al. 2000).

The task of identifying populations within an ESU will require making judgements based on the available information. Information regarding the geography, ecology, and genetics of the ESU are relevant to this determination. Although NOAA Fisheries has not compiled and formally reviewed all the available information for this purpose, it is reasonable to conclude that, at a minimum, each of the major subbasins in the ESU represent a population within the context of this discussion. A-run populations would therefore include at least the tributaries to the lower Clearwater, the upper Salmon River and its tributaries, the lower Salmon River and its tributaries, the Grand Ronde, Imnaha, and possibly the Snake River mainstem tributaries below Hells Canyon Dam. B-run populations would be identified in the Middle Fork and South Fork Salmon Rivers and the Lochsa and Selway Rivers (major tributaries of the upper Clearwater), and possibly in the mainstem Clearwater River, as well. These basins are, for the most part, large geographical areas and it is quite possible that there is additional population structure within at least some of these basins. However, because that hypothesis has not been confirmed, NOAA Fisheries assumes that there are at least five populations of A-run steelhead and five populations of B-run steelhead in the Snake River basin ESU. Escapement objectives for A and B-run production areas in Idaho, based on estimates of smolt production capacity, are shown in Table 1.

Table 1. Adult Steelhead Escapement Objectives Based on Estimates of 70% Smolt Production Capacity

A-Run Production Areas		**B-Run Production Areas**	
Upper Salmon	13,570	Mid Fork Salmon	9,800
Lower Salmon	6,300	South Fork Salmon	5,100
Clearwater	2,100	Lochsa	5,000
Grand Ronde	(1)	Selway	7,500
Imnaha	(1)	Clearwater	4,000
Total	**21,970**	**Total**	**31,400**

Note: comparable estimates are not available for populations in Oregon and Washington subbasins.

1.2.1. Lower Snake River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Lower Snake River is summarized from the Lower Snake River Subbasin Biological Assessment (BLM 2000a), except where noted.

1.2.1.1. Species Distribution:

Within the Lower Snake River Subbasin steelhead use occurs in most of the accessible streams when stream conditions are suitable. Steelhead use the mainstem Snake River for upstream and downstream passage. A limited amount of juvenile rearing and overwintering by adults occurs in the Snake River. Most accessible tributaries are used by steelhead for spawning and rearing. The larger streams used for spawning and rearing include Asotin, Ten Mile, Couse, Captain John, Jim, and Cook Creeks. Other smaller tributary streams with limited rainbow/steelhead use include Tammany, Tenmile, Corral, Cache, Cottonwood, and Cherry Creeks.

1.2.1.2. Location of Important Spawning and Rearing Areas:

Asotin Creek, followed by Captain John, Ten Mile, and Couse Creeks have the highest potential for steelhead production within the subbasin. Priority watersheds include Asotin and Captain John Creeks.

1.2.1.3. Conditions and Trends of Populations:

Despite their relatively broad distribution, very few healthy steelhead populations exist (Quigley and Arbelbide 1997). Recent status evaluations suggest many steelhead stocks are depressed. A recent multi-agency review showed that total escapement of salmon and steelhead to the various Columbia River regions has been in decline since 1986 (Anderson et al. 1996). Existing steelhead stocks consist of four main types: wild, natural (non-indigenous progeny spawning naturally), hatchery, and mixes of natural and hatchery fish. Production of wild anadromous fish in the Columbia River Basin has declined about 95% from historical levels (Huntington et al. 1994). Most existing steelhead production is supported by hatchery and natural fish as a result of large-scale hatchery mitigation production programs. Wild, indigenous fish, unaltered by hatchery stocks, are rare and present in only 10% of the historical range and 25% of the existing range. Remaining wild stocks are concentrated in the Salmon and Selway (Clearwater Basin) rivers in central Idaho and the John Day River in Oregon. Although few wild stocks were classified as strong, the only subwatersheds classified as strong were those sustaining wild stocks.

1.2.2. Clearwater River, North Fork Clearwater River, and Middle Fork Clearwater River Subbasins

Information on steelhead distribution, important watersheds, and conditions and trends in the Clearwater River is summarized from the Clearwater River, North Fork Clearwater River and Middle Fork Clearwater River Subbasins Biological Assessment (BLM 2000b), except where noted.

1.2.2.1. Species Distribution:

Within the Clearwater River Subbasin steelhead use is widespread and most accessible tributaries are used year-long or seasonally. In the Clearwater River drainage, the primary steelhead producing streams include: Potlatch River; Lapwai, Big Canyon, Little Canyon, Lolo, and Lawyer Creeks. Other Clearwater River mainstem tributary streams providing spawning and/or rearing habitat for steelhead trout include Lindsay, Hatwai, Lapwai, Catholic, Cottonwood, Pine, Bedrock, Jacks, Big Canyon, Orofino, Jim Ford, Big, Fivemile, Sixmile, and Tom Taha Creeks. Some of these streams provide sub-optimal spawning and rearing habitat because of steep stream gradients, barriers, low flows, limited spawning gravels, and small size of tributaries.

In the 1969 the U.S. Army Corps of Engineers finished construction of Dworshak Dam on the North Fork Clearwater River, which totally blocked access to anadromous fish. To mitigate for the steelhead losses resulting from the dam, Dworshak National Fish Hatchery (NFH) was constructed in 1969. Wild B-run steelhead are collected at the base of the dam and used as the brood stock for Dworshak NFH. Since 1992, steelhead eggs collected at Dworshak NFH have been shipped as eyed eggs to the Clearwater Fish Hatchery, located at the confluence of the North Fork Clearwater River and the Clearwater River, for incubation and rearing.
Three satellite facilities are associated with the Clearwater Fish Hatchery: Crooked River, Red River, and Powell. The Kooskia NFH is located on Clear Creek, a tributary to the Middle Fork Clearwater River.

1.2.2.2. Location of Important Spawning and Rearing Areas:

The only watershed identified as a special emphasis or priority watershed for steelhead in the Clearwater River Subbasin is Lolo Creek.

1.2.2.3. Conditions and Trends of Populations:

Refer to “Conditions and Trends of Populations” under Lower Snake River Subbasin above.

1.2.3. South Fork Clearwater River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the South Fork Clearwater River is summarized from the Draft Clearwater Subbasin Assessment (CPAG 2002), except where noted.

1.2.3.1. Species Distribution:

Within the South Fork Clearwater River Subbasin, steelhead use is widespread, and most accessible tributaries are used year-long or seasonally. In the South Fork drainage, the primary steelhead producing drainages include Newsome Creek, American River, Red River, and Crooked River. Other South Fork Clearwater River mainstem tributary streams providing spawning and/or rearing habitat for steelhead trout include Tenmile, Johns, Meadow, and Mill Creeks (Jody Brostrom, Idaho Department of Fish and Game, pers. comm. March 30, 2001). Low order streams and accessible headwater portions of high order streams provide early rearing habitat (Nez Perce National Forest 1998).

1.2.3.2. Location of Important Spawning and Rearing Areas:

Important spawning habitat in the South Fork Clearwater occurs primarily in Newsome Creek, American River, Red River, and Crooked River.

1.2.3.3. Conditions and Trends of Populations:

The South Fork Clearwater River may have historically maintained a genetically unique stock of steelhead trout, but hatchery supplementation has since clouded the lines of genetic distinction between stocks (Nez Perce National Forest 1998). Robin Waples (In a letter to S. Kiefer, Idaho Department of Fish and Game, August 25, 1998) found that steelhead in Johns and Tenmile Creeks are genetically most similar to fish originating from the Selway River system, suggesting that some genetic difference may have existed historically within the South Fork Clearwater drainage. A statewide genetic analysis is currently being conducted using DNA markers, and may provide more information on past and current genetic distinctions between steelhead stocks in the Clearwater subbasin (Byrne 2001).

1.2.4. Selway River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Selway River is summarized from the Lower Selway Biological Assessment (USFS 1999a), the

Biological Opinion on Culvert Replacements on Lolo Creek and Lochsa River (NMFS 2002a), and the Biological Opinion on Recreational Suction Dredge Mining in Lolo Creek (NOAA Fisheries 2003), except where noted.

1.2.4.1. Species Distribution:

High numbers of juvenile steelhead have been documented in all of the fifth code watersheds above the Selway-Bitterroot wilderness boundary. In addition, Meadow and Gedney Creeks also support high numbers of both steelhead and resident rainbow trout. Densities of steelhead are less in O'hara, Swiftwater, Goddard, and Falls Creeks (USFS unpublished data 1990 - 1998). Densities in Nineteenmile, Rackliffe, Boyd, and Glover Creeks are limited by small size and accessibility although the species is present. Spawning habitat for steelhead has been documented in most of the surveyed tributaries, including small third order streams such as Renshaw and Pinchot Creeks. In the Selway River, stream survey data and casual observations suggest that the steelhead/rainbow population in the larger tributaries, i.e. Meadow and Moose Creeks, are composed of a significant resident rainbow/redband component (USFS unpublished data 1996, 1997). Survey data and observations revealed the presence of large number of rainbow trout greater than 220 mm, especially in North Moose Creek. In addition, observations suggest the presence of two distinct forms of this species. Steelhead and rainbow of all sizes differed phenotypically; there appeared to be a distinct "steelhead" presmolt form, which was more bullet-shaped and silvery in color, and a distinct "trout" form, which was less bullet-shaped, retained parr marks at larger sizes, and exhibited coloration and spotting more typical of other inland rainbow populations. It is possible that resident rainbow trout and steelhead are reproductively isolated, which may have resulted in genetic divergence. Analysis of the genetic composition of the Moose Creek population may be attempted in future years.

1.2.4.2. Location of Important Spawning and Rearing Areas:

The most important spawning and rearing areas for steelhead are located in the larger tributaries, such as Meadow, Moose, Gedney, Three Links, Marten, Bear, Whitecap, Running, Ditch, Deep, and Wilkerson Creeks. Moose Creek may support the most significant spawning and rearing habitat for steelhead trout of any of these tributaries.

1.2.4.3. Conditions and Trends of Populations:

The Selway River drainage (along with the Lochsa and lower Clearwater River tributary systems) is one of the only drainages in the Clearwater Subbasin where steelhead populations have little or no hatchery influence (Busby et al. 1996; IDFG 2001). The USFS (1999a) identified the Lochsa and Selway River systems as refugia areas for steelhead based on location, accessibility, habitat quality, and number of roadless tributaries. The Idaho Department of Fish and Game (IDFG) estimates that approximately 80% of the wild steelhead in the Clearwater River Subbasin are destined for the Lochsa River and Selway River drainages. The Clearwater River Basin produces the majority of B-run steelhead in the Snake River ESU, and most of the Clearwater steelhead are produced in the Lochsa River Subbasin. The Lochsa River Subbasin has the highest observed densities of age 1+ B-run steelhead parr, and the highest percent carrying capacity (IDFG 1999). Hatchery steelhead were used to supplement natural populations in the Lochsa River drainage before 1982, but current management does not include any hatchery supplementation. Current adult returns are considered to be almost entirely wild steelhead trout progeny.

1.2.5. Lochsa River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Lochsa River is summarized from the Biological Opinion on Culvert Replacements on Lolo Creek and Lochsa River (NMFS 2002a) and the Biological Opinion on Recreational Suction Dredge Mining in Lolo Creek (NOAA Fisheries 2003), except where noted.

1.2.5.1. Species Distribution:

Adult Snake River steelhead are present in the upper mainstem Clearwater River in September and October, and in the upper mainstem and Middle Fork Clearwater Rivers in the winter. Spawning and incubation occurs in streams such as the Lochsa River from March through July. Steelhead juveniles then typically rear for 2 to 3 years in the tributaries and larger rivers before beginning a seaward migration during February through May.

1.2.5.2. Location of Important Spawning and Rearing Areas:

Steelhead have been observed in most of the larger tributaries to the Lochsa River, with high steelhead productivity occurring in Fish, Boulder, Deadman, Pete King, and Hungery Creeks (USFS 1999b).

1.2.5.3. Conditions and Trends of Populations:

Refer to “Conditions and Trend of Populations” under Selway River Subbasin above.

1.2.6. Lower Salmon River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Lower Salmon River is summarized from the Lower Salmon River Subbasin Biological Assessment (BLM 2000c).

1.2.6.1. Species Distribution:

Within the Lower Salmon River Subbasin, steelhead use occurs in most of the accessible streams when stream conditions are suitable. Steelhead use the mainstem Salmon River for upstream and downstream passage. A limited amount of juvenile rearing and adult overwintering may occur in the Salmon River. Most accessible tributaries are used by steelhead for spawning and rearing. The larger streams used for spawning and rearing include China, Eagle, Deer, Cottonwood, Maloney, Deep, Rice, Rock, White Bird, Skookumchuck, Slate, John Day, Race, Lake, Allison, Partridge, Elkhorn, and French Creeks. Other smaller tributary streams with limited rainbow/steelhead use include Flynn, Wapshilla, Billy, Burnt, Round Springs, Telcher, Deer, McKinzie, Christie, Sherwin, China, Cow, Fiddle, Warm Springs, Van, and Robbins Creeks.

1.2.6.2. Location of Important Spawning and Rearing Areas:

Slate Creek, followed by White Bird Creek, has the highest potential for steelhead production within the subbasin. Priority watersheds identified for steelhead include China, Eagle, Deer, White Bird, Skookumchuck, Slate, John Day, Race, Allison, Partridge, and French Creeks. Other streams which are important for spawning and rearing include Cottonwood, Maloney, Deep, Rice, Rock, Lake, and Elkhorn Creeks.

1.2.6.3. Conditions and Trends of Populations:

The Bureau of Land Management (BLM) noted that current numbers of naturally spawning steelhead in the Salmon River Subbasin are at all time lows, and overall trend is downward. Adult steelhead were commonly observed in most larger tributaries during the 1970s through 1980s, but now such observations have significantly declined (BLM 2000c).

The Nez Perce National Forest conducted an ecosystem analysis at the watershed scale for Slate Creek (USFS 2000) and concluded that the distribution of fish species assessed is relatively consistent with historic distribution. Steelhead populations are thought to have experienced a great decline from historic levels although the data to describe the extent of this reduction is not available (USFS 2000). The BLM has conducted trend monitoring of fish populations in lower Partridge Creek and French Creek. Partridge Creek densities of age 0 rainbow/steelhead in 1988 were 0.30 fish/m2 and age 1 rainbow/steelhead trout densities were 0.19 fish/m2. In 1997, age 0 densities were 0.003 fish/m2 and age 1 densities were 0.01 fish/m2. French Creek densities of age 0 rainbow/steelhead trout in 1991 were 0.07 fish/m2 and age 1 rainbow/steelhead densities were 0.07 fish/m2. In 1997, age 0 densities were 0.0075 fish/m2 and age 1 densities were 0.02 fish/m2. Densities of steelhead trout have significantly declined from the 1980s through the late 1990s.

1.2.7. Little Salmon River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Little Salmon River is summarized from the Little Salmon River Subbasin Biological Assessment (BLM 2000d), except where noted.

1.2.7.1. Species Distribution:

Within the Little Salmon River Subbasin, steelhead trout use occurs in the lower portion of the subbasin and tributaries, downstream from barriers located at river mile (RM) 21 in the Little Salmon River. No recent or historic documentation exists for steelhead using streams above RM 24 in the Little Salmon River. Welsh et al. (1965) reports that no known passage by salmon or steelhead exists above the Little Salmon River falls. Ineffectual fish passage facilities were constructed at the falls by the Civilian Conservation Corps during the 1930s (Welsh et al. 1965). Streams and rivers providing important spawning and rearing for steelhead include Little Salmon and River Rapid Rivers, and Boulder, Hazard, and Hard Creeks. Other Little Salmon River mainstem tributary streams providing spawning and rearing habitat include Squaw, Sheep, Hat, Denny, Lockwood, Rattlesnake, Elk, and Trail Creeks. Adult steelhead have been documented in these streams. Primary steelhead use of these streams is often associated with the mouth area or a small stream segment or lower reach, before steep gradients/cascades or a barrier restricts upstream fish passage. These streams generally provide sub-optimal spawning and rearing habitat because of steep stream gradients, barriers, low flows, limited spawning gravels, and small size of tributaries.

1.2.7.2. Location of Important Spawning and Rearing Areas:

Priority watersheds for steelhead include Rapid River, Boulder, Hazard, and Hard Creeks. These streams provide important spawning and rearing habitat for steelhead. Rapid River is a stronghold and key refugia area for steelhead.

1.2.7.3. Conditions and Trends of Populations:

The BLM noted that current numbers of naturally spawning steelhead in the Little Salmon River Subbasin are at all-time lows, and overall trend is downward. The highest number of adult natural spawning steelhead counted at the Rapid River weir was 162 in 1993, and the lowest counted was 10 in 1999 (BLM 2000d).

1.2.8. Middle Salmon River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Middle Salmon River is summarized from the Middle Salmon River and South Fork Salmon River Subbasins Biological Assessment (BLM 2000e), except where noted.

1.2.8.1. Species Distribution:

Within the Middle Salmon River Subbasin, steelhead use the mainstem Salmon River for upstream and downstream passage. A limited amount of juvenile rearing and adult overwintering may occur in the Middle Salmon River. Most accessible tributaries are used by steelhead for spawning and rearing. Key steelhead spawning and rearing is probably occurring in Crooked, Bargamin and Sabe Creeks and the lower Wind River on the north side of the Salmon River and California, Warren, Chamberlain, and Horse Creeks on the south side of the Salmon River.

1.2.8.2. Location of Important Spawning and Rearing Areas:

Priority watersheds for steelhead include Warren and California Creeks. Steelhead use Warren Creek for spawning and rearing habitat. No fish passage barriers exist for steelhead within the drainage. Steelhead were found in Richardson, Stratton, Steamboat, and Slaughter Creeks (Raleigh 1995). Most other tributaries were surveyed, but no steelhead were found. Because of habitat alterations from past mining (e.g., in-channel dredging, piling of dredged material adjacent to streams) and limited suitable habitat, steelhead use of the upper portion of the Warren Creek subwatershed is limited. Carey and Bear Creeks provide habitat in the lower reaches.

1.2.8.3. Conditions and Trend of Populations:

Refer to “Conditions and Trends of Populations” under Lower Salmon River Subbasin above.

1.2.9. South Fork Salmon River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the South Fork Salmon River is summarized from the Middle Salmon River and South Fork Salmon River Subbasins Biological Assessment (BLM 2000e), except where noted.

1.2.9.1. Species Distribution:

Steelhead have been documented in the South Fork Salmon River and lower portions of its major tributaries. Most of the mainstem spawning occurs between the East Fork Salmon River and Cabin Creek. Principle spawning areas are located near Stolle Meadows, from Knox Bridge to Penny Spring, Poverty Flat, Darling cabins, the Oxbow, and from 22 Hole to Glory Hole (USFS 1998).

1.2.9.2. Location of Important Spawning and Rearing Areas:

Primary spawning tributaries in the South Fork Salmon River Subbasin are Burntlog, Lick, Lake, and Johnson Creeks, the East Fork South Fork Salmon and Secesh Rivers (USFS 1998).

1.2.9.3. Conditions and Trends of Populations:

Refer to "Conditions and Trends of Populations" under Lower Salmon River Subbasin above.

1.2.10. Upper Salmon River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Upper Salmon River is summarized from the Biological Opinion on Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest (NMFS 2002b).

1.2.10.1. Species Distribution:

Steelhead in the Upper Salmon River subbasin occur in most of the accessible streams when stream conditions are suitable. Steelhead use the mainstem for upstream and downstream passage. A limited amount of juvenile rearing and adult overwintering occurs in the Upper Salmon River. Most accessible tributaries are used for spawning and rearing.

1.2.10.2. Location of Important Spawning and Rearing Areas:

Key steelhead spawning and rearing probably occurs in Morgan, Thompson and Panther Creeks, in addition to the Yankee Fork Salmon, Pahsimeroi, North Fork Salmon, East Fork Salmon, and Lemhi Rivers.

1.2.10.3. Conditions and Trends of Populations:

Refer to "Conditions and Trends of Populations" under Lower Salmon River Subbasin above.

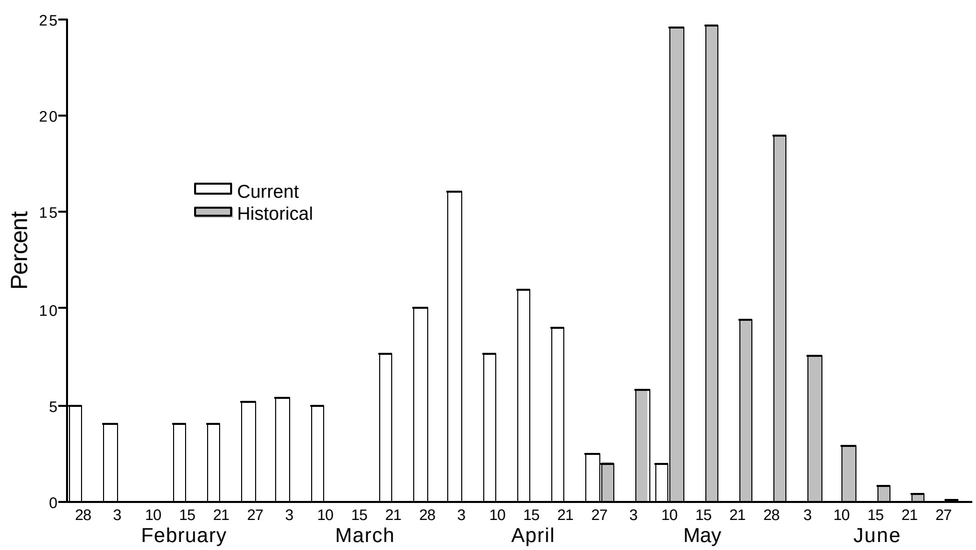
1.3. Hatchery Populations

Hatchery populations, if genetically similar to their natural-origin counterparts, provide a hedge against extinction of the ESU or of the gene pool. The Imnaha and Oxbow hatcheries produce A-run stocks that are currently included in the Snake River basin steelhead ESU. The Pahsimeroi and Wallowa hatchery stocks may also be appropriate and available for use in developing supplementation programs; NOAA Fisheries required in its recent biological opinion on Columbia basin hatchery operations that this program begin to transition to a local-origin broodstock to provide a source for future supplementation efforts in the lower Salmon River (NMFS 1999). Although other stocks provide more immediate opportunities to initiate supplementation programs within some subbasins, it may also be necessary and desirable to develop additional broodstocks that can be used for supplementation in other natural production areas. Despite uncertainties related to the likelihood that supplementation programs can accelerate the recovery of naturally spawning populations, these hatchery stocks provide a safeguard against the further decline of natural-origin populations.

The Dworshak NFH is unique in the Snake River Basin in producing a B-run hatchery stock. The Dworshak stock was developed from natural-origin steelhead from the North Fork Clearwater River, is largely free of other hatchery introductions, and was therefore included in the ESU, although not as part of the listed population. However, past hatchery practices and possibly changes in flow and temperature conditions related to Dworshak Dam have lead to substantial divergence in spawn timing of the hatchery stock compared to historical timing in the North Fork Clearwater River, and compared to natural-origin populations in other parts of the Clearwater Basin. Because the spawn timing of the hatchery stock is much earlier than historically (Figure 6), the success of supplementation efforts using these stocks may be limited. In fact, past supplementation efforts in the South Fork Clearwater River using Dworshak NFH stock have been largely unsuccessful, although improvements in out-planting practices have the potential to yield different results. In addition, the unique genetic character of Dworshak NFH steelhead will limit the degree to which the stock can be used for supplementation in other parts of the Clearwater Subbasin, and particularly in the Salmon River B-run basins. Supplementation efforts in those areas, if undertaken, will more likely have to rely on the future development of local broodstocks. Supplementation opportunities in many of the B-run production areas may be limited because of logistical difficulties associated with high mountain, wilderness areas.

Because opportunities to accelerate the recovery of B-run steelhead through supplementation, even if successful, are expected to be limited, it is essential to maximize the escapement of natural-origin steelhead in the near term.

Figure 6. Historical Versus Current Spawn-Timing of Steelhead at Dworshak Hatchery.



1.4. Conclusion

Finally, the conclusion and recommendations of the TAC's All Species Review (TAC 1997) are pertinent to this status review of Snake River steelhead. Considering information available through 1996, the 1997 All Species Review stated:

> "Regardless of assessment methods for A and B steelhead, it is apparent that the primary goal of enhancing the upriver summer steelhead run is not being achieved. The status of upriver summer steelhead, particularly natural-origin fish, has become a serious concern. Recent declines in all stocks, across all measures of abundance, are disturbing."

> "There has been no progress toward rebuilding upriver runs since 1987. Throughout the Columbia River basin, dam counts, weir counts, spawning surveys, and rearing

> densities indicate natural-origin steelhead abundance is declining, culminating in the proposed listing of upriver stocks in 1996. Escapements have reached critically low levels despite the relatively high productivity of natural and hatchery rearing environments. Improved flows and ocean conditions should increase smolt-adult survival rates for upriver summer steelhead. However, reduced returns in recent years are likely to produce fewer progeny and lead to continued low abundance."
>
> "Although steelhead escapements would have increased (some years substantially) in the absence of mainstem fisheries, data analyzed by the TAC indicate that effects other than mainstem Columbia River fishery harvest are primarily responsible for the currently depressed status and the long term health and productivity of wild steelhead populations in the Columbia River."
>
> "Though harvest is not the primary cause of declining summer steelhead stocks, and harvest rates have been below guidelines, harvest has further reduced escapements. Prior to 1990, the aggregate of upriver summer steelhead in the mainstem Columbia River appears at times to have led to the failure to achieve escapement goals at Lower Granite Dam. Wild Group B steelhead are presently more sensitive to harvest than other salmon stocks, including the rest of the steelhead run, due to their depressed status and because they are caught at higher rates in the Zone 6 fishery."

Small or isolated populations are much more susceptible to stochastic events such as drought and poor ocean conditions. Harvest can further increase the susceptibility of such populations. The Columbia River Fish Management Plan (TAC 1997) recognizes that harvest management must be responsive to run size and escapement needs to protect these populations. The parties should ensure that TAC 1997 harvest guidelines are sufficiently protective of weak stocks and hatchery broodstock requirements.

For the Snake River steelhead ESU as a whole, the median population growth rate (lambda) from years 1980-1997, ranges from 0.699 to 0.978, depending on the assumed number of hatchery fish reproducing in the river (Table 2). NOAA Fisheries estimated the risk of absolute extinction for A- and B-runs, based on assumptions of complete hatchery spawning success, and no hatchery spawning success. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e., hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish. At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 for both runs.

Table 2. Annual rate of population change (λ) in Snake River steehead, absolute risk of extinction (1 fish/generation), and risk of 90% decline in 24 and 100 years for the period 1980-1997[†]. The range of reported values assumes that hatchery-origin fish either do not contribute to

Model Assumptions	l	**Risk of Extinction**		**Probability of 90% decrease in stock abundance**	
		24 years	100 years	24 years	100 years
No Correction for Hatchery Fish	0.978	A-Run 0.000 B-Run 0.000	A-Run 0.000 B-Run 0.000	A-Run 0.000 B-Run 0.060 Aggregate 0.000	A-Run 0.000 B-Run 0.520 Aggregate 0.434
No Instream Hatchery Reproduction	0.910	A-Run 0.000 B-Run 0.000	A-Run 0.010 B-Run 0.093	A-Run 0.200 B-Run 0.730 Aggregate 0.476	A-Run 1.000 B-Run 1.000 Aggregate 1.000
Instream Hatchery Reproduction = Natural Reproduction	0.699	A-Run 0.000 B-Run 0.000	A-Run 1.000 B-Run 1.000	A-Run 1.000 B-Run 1.000 Aggregate 1.000	A-Run 1.000 B-Run 1.000 Aggregate 1.000

† From Table B-2a and B-2b. Cumulative Risk Initiative. September 5, 2000, revised appendix B (McClure et al. 2000).

natural production or are as productive as natural-origin spawners.

1.5. References

Anderson, D.A., G. Christofferson, R. Beamesderfer, and others. 1996. Streamnet: the north-west aquatic resource information network. Report on the status of salmon and steelhead in the Columbia River basin, 1995. Unpublished report, Project number 88-108-04, Contract Number 95B165130, Northwest Power Planning Council and U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon.

Barnhart, R. A. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)–steelhead. U.S. Fish and Wildlife Service, Biological Report 82 (11.60).

Behnke, R. J. 1992. Native trout of western North America. American Fisheries Society Monograph 6, Bethesda, Maryland.

Bureau of Land Management (BLM). 2000a. Lower Snake River Subbasin: Biological Assessment of Ongoing and Proposed Bureau of Land Management Activities on Sockeye Salmon, Fall Chinook Salmon, Spring/Summer Chinook Salmon, Steelhead Trout, Bull Trout, and BLM Sensitive Species. Cottonwood, Idaho.

BLM. 2000b. Clearwater River, North Fork Clearwater River, and Middle Fork Clearwater River Subbasins: Biological Assessment of Ongoing and Proposed Bureau of Land Management Activities on Sockeye Salmon, Fall Chinook Salmon, Spring/Summer Chinook Salmon, Steelhead Trout, Bull Trout, and BLM Sensitive Species. Cottonwood, Idaho.

BLM. 2000c. Lower Salmon River Subbasin: Biological Assessment of Ongoing and Proposed Bureau of Land Management Activities on Sockeye Salmon, Fall Chinook Salmon, Spring/Summer Chinook Salmon, Steelhead Trout, Bull Trout, and BLM Sensitive Species. Cottonwood, Idaho.

BLM. 2000d. Little Salmon River Subbasin: Biological Assessment of Ongoing and Proposed Bureau of Land Management Activities on Sockeye Salmon, Fall Chinook Salmon, Spring/Summer Chinook Salmon, Steelhead Trout, Bull Trout, and BLM Sensitive Species. Cottonwood, Idaho.

BLM. 2000e. Middle Salmon River and South Fork Salmon River Subbasins: Biological Assessment of Ongoing and Proposed Bureau of Land Management Activities on Sockeye Salmon, Fall Chinook Salmon, Spring/Summer Chinook Salmon, Steelhead Trout, Bull Trout, and BLM Sensitive Species. Cottonwood, Idaho.

Burgner, R. L., J. T. Light, L. Margolis, T. Okazaki, A. Tautz, and S. Ito. 1992. Distribution and origins of steelhead trout (Oncorhynchus mykiss) in offshore waters of the North Pacific Ocean. International North Pacific Fish Commission Bulletin 51.

Busby, P. J., T. C. Wainwright, G. J. Bryant, L. J. Lierheimer, R. S. Waples, F. W. Waknitz, and I. V. Lagomarsino. 1996. Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC-27. August.

Byrne, A. 2001. Steelhead Supplementation Studies in Idaho Rivers. 2000 Annual Report.Idaho Department of Fish and Game Report 01-15. Bonneville Power Administration Project Number: 199005500.

CPAG (Clearwater Policy Advisory Group). 2002. Draft Clearwater Subbasin Assessment, September 2002. Submitted for review to the Northwest Power Planning Council, Portland, Oregon.

Everest, F. H. 1973. Ecology and management of summer steelhead in the Rogue River. Oregon State Game Commission, Fisheries Research Report 7, Corvallis, Oregon.

Giger, R. D. 1973. Streamflow requirements of salmonids. Oregon Wildlife Commission, Final Report (Project AFS-62-1), Portland, Oregon.

Hall-Griswold, J. A., and C. E. Petrosky. 1998. Idaho habitat/natural production monitoring. Part 1: general monitoring subproject. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Annual Report 1996 (Project 91-73), Portland, Oregon.

Hartt, A. C., and M. B. Dell. 1986. Early oceanic migrations and growth of juvenile Pacific salmon and steelhead trout. International North Pacific Fisheries Commission Bulletin 46:1-105.

Huntington, C.W., W. Nehlsen, and J. Bowers. 1994. Healthy native stocks of anadromous salmonids in the Pacific Northwest and California. Portland, Oregon: Oregon Trout.

Idaho Department of Fish and Game (IDFG). 1999. Parr Monitoring Database: 1985-1987 Snorkel Survey Fish Counts for the Clearwater Basin. Idaho Fish and Game, Boise, Idaho

IDFG. 2001. IDFG Fisheries Management Plan 2001-2006. Idaho Fish and Game, Boise, Idaho.

Marmorek, D. R., and C. N. Peters, editors. 1998. Plan for analyzing and testing hypotheses (PATH): preliminary decision analysis report on Snake River spring/summer chinook. ESSA Technologies Ltd., Vancouver, British Columbia.

McElhany, P., M. Ruckelshaus, M. J. Ford, T. Wainwright, and E. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. National Marine Fisheries Service, Northwest Fisheries Science Center, Draft Report, Seattle, Washington. January 6.

Mealy, S. P. 1997. Letter re: State of Idaho's comments on the proposed listing of Snake River steelhead for protection under the Federal Endangered Species Act. Idaho Department of Fish and Game. February 11.

Meehan, W. R., and T. C. Bjornn. 1991. Salmonid distributions and life histories. Pages 47-82 in W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19, Bethesda, Maryland.

National Marine Fisheries Service (NMFS). 1999. Biological Opinion on Artificial Propagation in the Columbia River Basin—incidental take of listed salmon and steelhead from Federal and non-Federal hatchery programs that collect, rear, and release unlisted fish species. Endangered Species Act Section 7 Consultation. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, Washington.

NMFS 2002a. Biological Opinion on Culvert Replacements on Lolo Creek and Lochsa River Idaho and Clearwater Counties, Idaho. Endangered Species Act Section 7 Consultation. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, Washington.

NMFS 2002b. Biological Opinion on Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest. Endangered Species Act Section 7 Consultation. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, Washington.

Nez Perce National Forest. 1998. South Fork Clearwater River Landscape Assessment. Volume I: Narrative.

Nickelson, T. E., J. W. Nicholas, A. M. McGie, R. B. Lindsay, D. L. Bottom, R. J. Kaiser, and S. E. Jacobs. 1992. Status of anadromous salmonids in Oregon coastal basins. Oregon Department of Fish and Wildlife, Research and Development Section, Corvallis, and Ocean Salmon Management, Newport, Oregon.

NOAA's National Marine Fisheries Service (NOAA Fisheries). 2003. - Biological Opinion on Recreational Suction Dredge Mining in Lolo Creek. Endangered Species Act Section 7 Consultation. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, Washington.

Quigley, T.M., and S.J. Arbelbide, technical editors. 1997. An assessment of ecosystem components in the interior Columbia Basin. USDA Forest Service. Pacific Northwest Research Station. General Technical Report PNW-GTR-405.

Raleigh, R. 1995. Warren Creek drainage stream inventory report. Payette National Forest, McCall Ranger District. 1993-1995, Contract #: 53-0256-3-21, Volume 1: Warren Creek and Lower Altitude Tributaries. McCall Ranger District, McCall, Idaho.

Technical Advisory Committee (TAC). 1997. All species review, 1996—summer steelhead: Columbia River fish management plan. TAC for U.S. v. Oregon. August 4 (Tables 8-11, updated).

TAC. 1999. Minutes of meeting May 4-5, 1999. TAC for U.S. v. Oregon.

U.S. Forest Service (USFS). 1998. Biological assessment for the potential effects of managing the Payette Nation Forest in the South Fork Salmon River section 7 watershed on Snake River spring/summer and fall chinook salmon and Snake River steelhead, Volume 19: ongoing projects. Payette National Forest, McCall, Idaho.

USFS. 1999a. Biological Assessment: Lower Selway 4th Code HUC. Fish, Wildlife and Plants. Nez Perce National Forest, Moose Creek Ranger District.

USFS. 1999b. Clearwater National Forest monitoring & evaluation report, fiscal year 1998. Clearwater National Forest, Orofino, Idaho.

USFS. 2000. Slate Creek Ecosystem Analysis at the Watershed Scale, Volumes 1 and 2. Nez Perce National Forest, Grangeville, Idaho.

Waples, R. S., O. W. Johnson, P. B. Aebersold, C. K. Shiflett, D. M. VanDoornik, D. J. Teel, and A. E. Cook. 1993. A genetic monitoring and evaluation program for supplemented populations of salmon and steelhead in the Snake River Basin. Report to the U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, contract DE-A179-89BP00911.

Welsh, T.L., S. V. Gebhards, H.E. Metsker, and R.V. Corning. 1965. Inventory of Idaho streams containing anadromous fish, including recommendations for improving production of salmon and steelhead - Part I Snake, Salmon, Weiser, Payette, and Boise River drainages. Idaho State Fish and Game Department.

Withler, I. L. 1966. Variability in life history characteristics of steelhead trout (Salmo gairdneri) along the Pacific coast of North America. Journal of the Fisheries Research Board of Canada 23:365-393.